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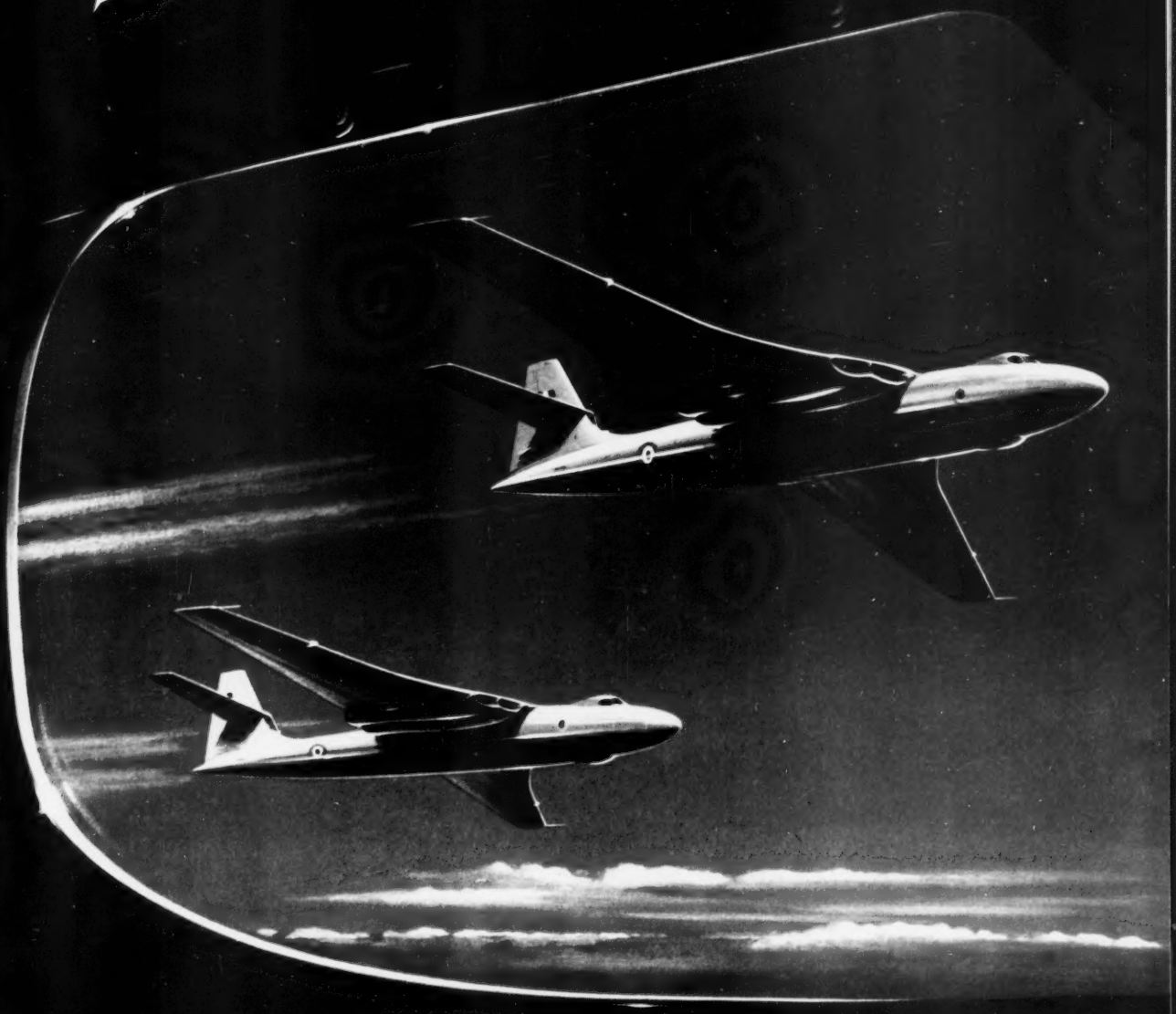

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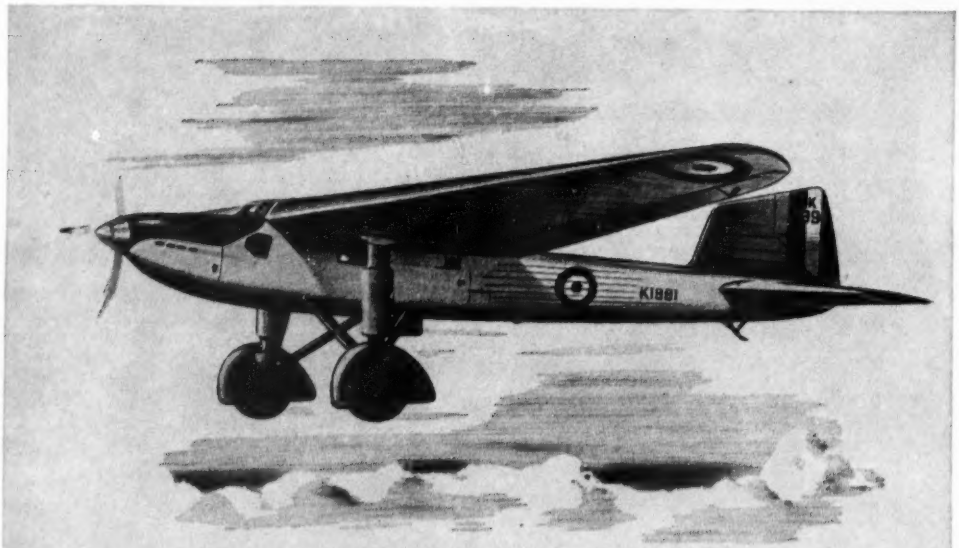

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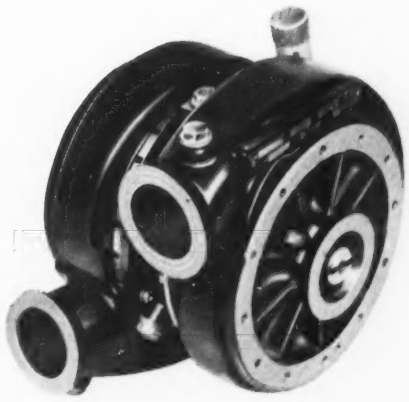

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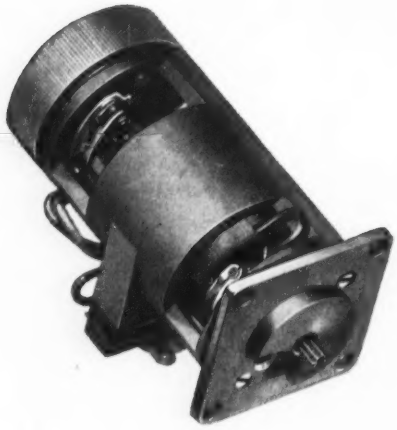

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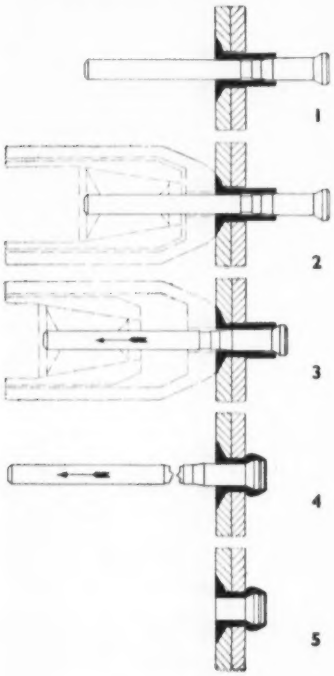

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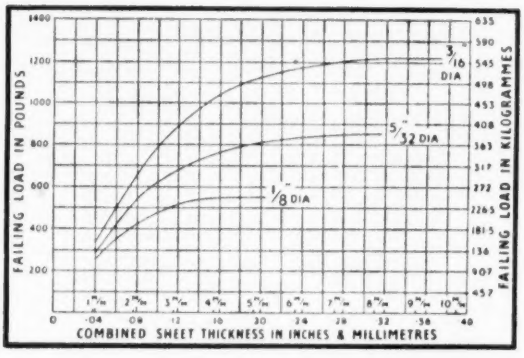

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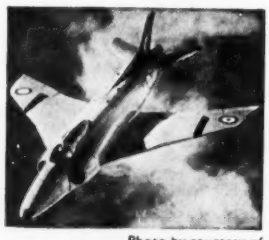

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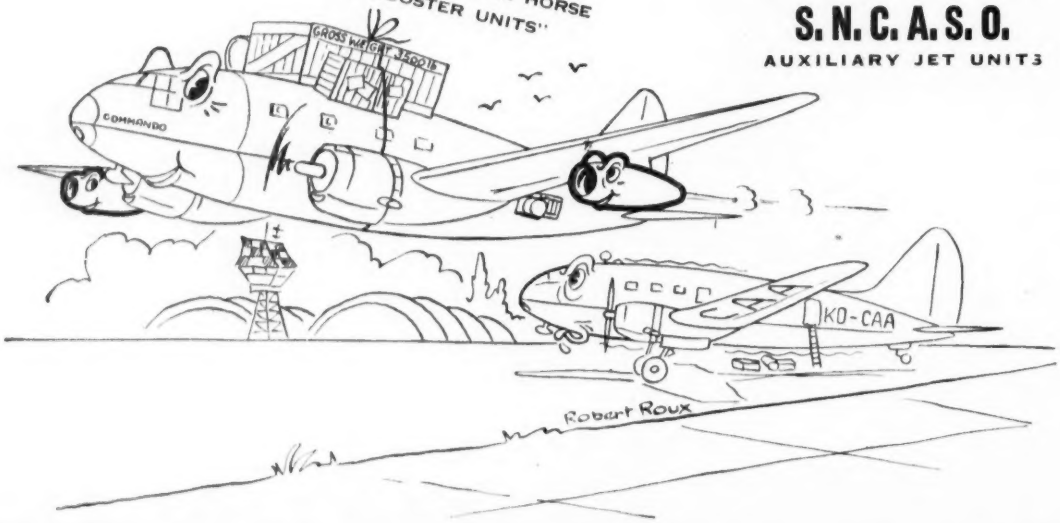

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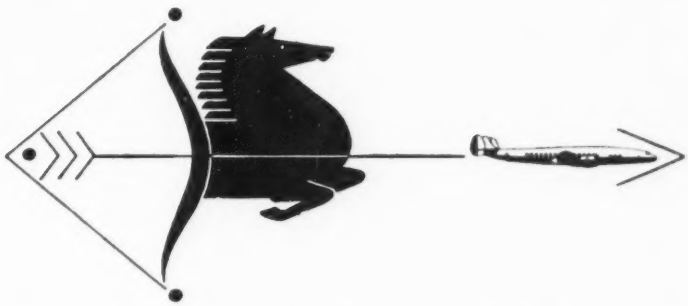

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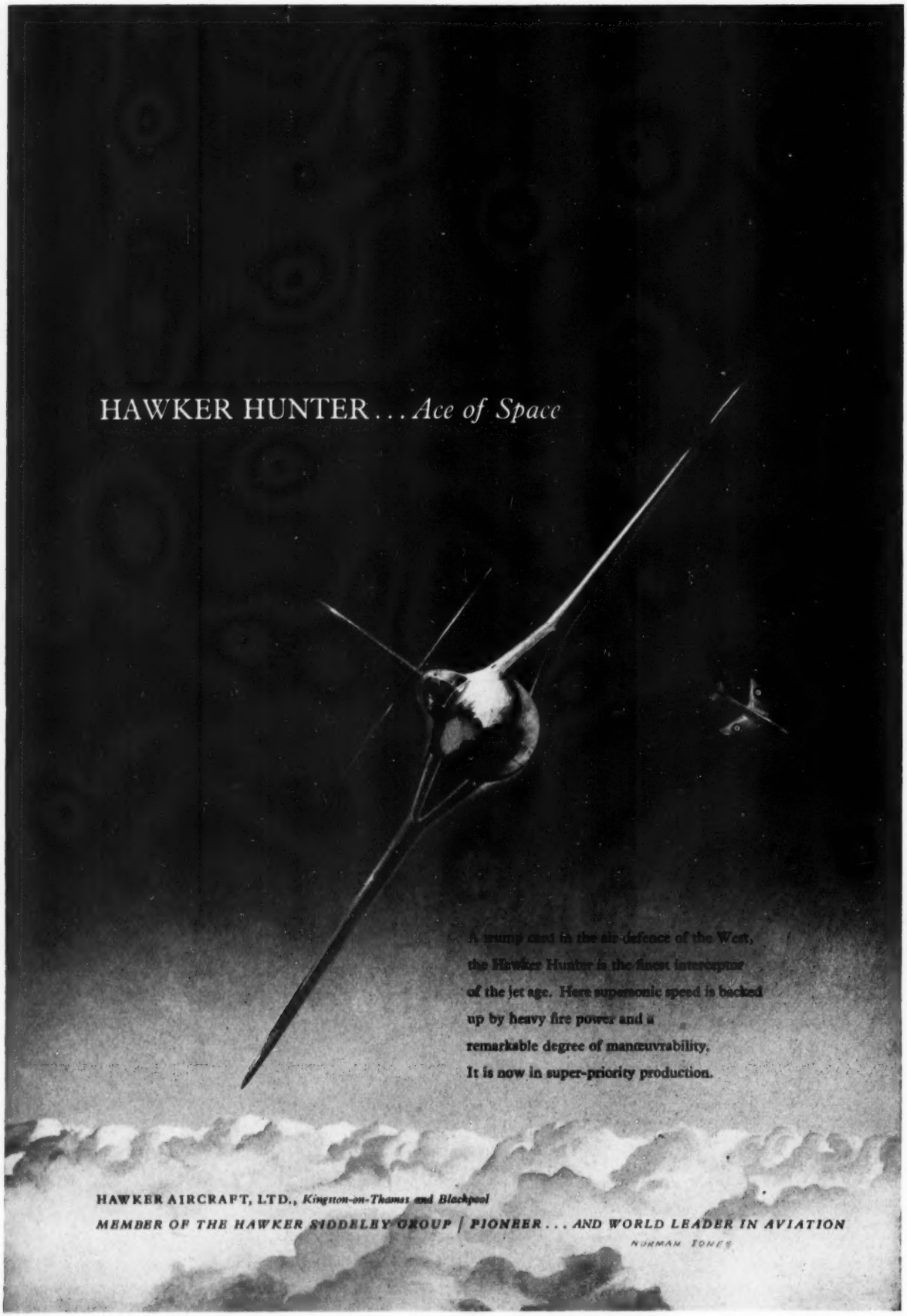
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IN THIS ISSUE:

Goodwill on Swept Wings 494
Engines—Are They Necessary? 497
The Well-dressed Airman, 1954 500
Gas-turbine Development 501
Axial-flow Engines - - 502
"With Deafening Clamour . . ." 504
The Industry in Miniature 506
Debut with a Bang - - 507
East Anglian Rotor Spray 508

Salute to Sweden

THE Royal Swedish Air Force is one of the great air forces of the world—great in strength, in its standard of manning and equipment, and in its morale and traditions. Thus, it was fitting that the R.A.F.—"the glorious Royal Air Force," as the Swedish C-in-C. once called it—should provide an escort of four Meteor squadrons for the visiting Saab J.29s, as described on page 494. It would have been more fitting still had the escort been mounted on Hunters or Swifts; but we promise our Swedish friends that when they next come calling on us we shall not ask them to throttle back so that we may keep station.

We must not be complacent, however, for we know that the Avon-powered Lansens now being built for the Swedish attack squadrons will be much superior in performance to the J.29s, and just what supersonic surprises will stem from research with the little Draken delta we can only guess.

The most pleasing aspect of Sweden's technological advancement is that it should have been achieved with British help. For very many years, indeed, Sweden has been a user of British aircraft and engines. Especially we recall the Harts, Ospreys, Bulldogs and Gladiators of pre-war years, and their Bristol engines; and, since the war, the Vampire and Goblin, and, more recently, the Avon, have played their parts.

From the operation (and, in some instances, construction) of these and other types of British aircraft and engines Sweden learned a great deal; and now, in the J.29, she is able to show us a fighter of her own design (though still powered by a British turbojet) having a performance well in excess of any squadron aircraft we ourselves can yet put into the air. Only the Sabre and the Mig-15 are in the same class.

Thus, the Swedes are now our rivals as well as our good friends; which is a very satisfactory state of affairs indeed.

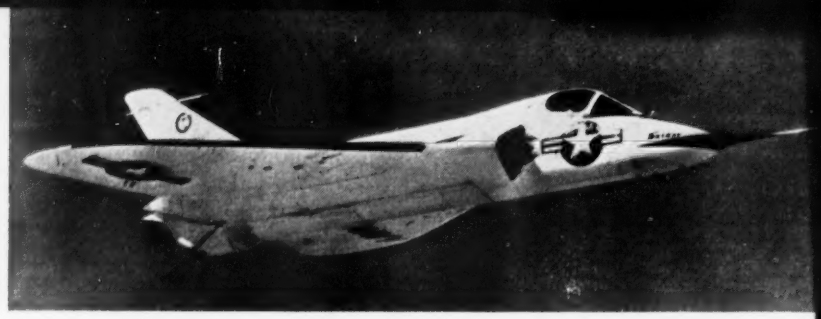
Soaring Enthusiasm

WITHIN the past year or two there has been more than one allusion—in our own columns and elsewhere—to lack of enthusiasm in the flying clubs. Various reasons have been put forward, with the ever-present "shortage of wherewithal" prominent among them. The gliding clubs, on the other hand, are in a happier position. If they have not increased very much in number, their membership nevertheless grows steadily. The 26 clubs affiliated to the British Gliding Association have some 2,000 flying members (actually 1,951 at the beginning of this year, the last census available); in 1946-1947 the corresponding figure was just over 1,000.

Like everything else, gliding is a more expensive hobby than it was before the war, but it remains a good deal cheaper than power flying—and this is especially true of the new member's instructional period. Most of the leading clubs now offer summer-holiday courses, which have served in some degree to ease the strain on their tuition facilities at week-ends. That a vacation of this kind can be both an educational and entertaining experience—either for a power pilot or for the man who has never previously flown any kind of aircraft—is demonstrated by an article on pages 497-499.

It has sometimes been argued that to learn to fly a glider is not necessarily a satisfactory introduction to power-piloting. For this impression there is some foundation, chiefly on the score that the two types of aircraft display a marked difference in control response, as the author of our article—graduating, as it were, in the opposite direction—realized. The difference, too, is of a kind that in theory could get an incautious pilot into trouble, though in practice it is unlikely that even a very raw novice in power flying could forget that he was no longer in control of an engineless aircraft; reactions are not so automatic as all that. But aside from such considerations, gliding can and does give the beginner a "feeling for the air." It also offers him outdoor exercise and a means of coming to terms with some of the most interesting manifestations of meteorology. In this it is comparable with small-boat sailing, a sport with which it has pronounced affinities. Both pastimes forgive minor mistakes, if not all major ones; both offer good fellowship; and neither places an impossible strain on the pocket.

FROM ALL QUARTERS



The Skyray Sets Its Mark

LAST Saturday, October 3rd, Lt-Cdr. James Verdin, U.S. Navy, flying the second prototype Douglas F4D Skyray, made a further attack on the world air speed record. His mean speed over four runs was accepted as 753.4 m.p.h. by the American National Aeronautic Association, and there is no reason to doubt that this figure will be ratified by the F.A.I.

The attempt was made over a three-kilometre (1.86 mile) course over the shore of the Salton Sea, one of the many flat lake-beds in southern California. The mean air temperature at the time is given as 98.5 deg F; the resulting Mach number is included in the table which we have prepared below. Salton Sea is below sea level and is clearly considered by the Douglas company as an even better site for record breaking than the great U.S.A.F. establishment at Edwards, farther north. For some weeks the Skyray involved has been based at El Centro, a Naval Auxiliary Air Station where final preparations were made.

The first runs, referred to on page 454 of last week's issue, did not reflect the true capabilities of the aircraft, for they were made in gusty conditions and at temperatures below average for the time of year. The attempt was postponed four times —once owing to a faulty fuel gauge, as was that of Lt-Cdr. Lithgow's Swift. But on October 3rd conditions were much better and, after the attempt, Verdin appeared well pleased. "The plane behaved perfectly," he said, "and turbulence did not bother me a bit. I feel very fortunate to have been able to make the run. I couldn't tell exactly but I believe I was flying at between 100 and 200ft on each pass." (F.A.I. rules permit 100 metres, or 328ft) Verdin concluded by saying "everything was wide open; there was a real boost when I turned those afterburners on." Spectators are reported to have seen the Skyray's afterburner glowing brightly on each run; the machine was in the air some 20 minutes and burnt about 3,500 lb of wide-cut gasoline.

The Skyray is a bat-winged intercepter designed for catapult operation from carriers. We were able to discuss the aircraft with its designer Ed Heinemann, chief engineer of the Douglas El Segundo factory, where Douglas Naval types are built: during his visit to this country last week he told us that the F4D sprang directly from interest engendered—independently by Douglas and the U.S. Navy—in the pioneering delta work of Prof. Lippisch. The design was fixed in essentials in 1948 and the prototype flew on January 23rd, 1951.

The Skyray has large air brakes and leading-edge slats, but flaps are not fitted. There is a conventional rudder, and each wing carries two power-controlled elevons, which can function together (as elevators) or in opposition (as ailerons). The planform no longer resembles the classic equilateral triangle of the Delta, but is to be regarded as a conventional wing with an unusually low aspect-ratio. The first two prototypes have been fitted with the Westinghouse J40 turbojet which was the engine originally intended for production Skyrays. Now that the J40 has been eliminated from Navy plans, Rolls-Royce or Pratt and Whitney are expected to provide a substitute power-unit. With an afterburner fitted the J40 developed about 12,500 lb thrust for short periods at sea level.

The first F4D is at Patuxent River, where carrier trials are awaiting the availability of a ship. This first aircraft has no afterburner. The second, record-breaking, Skyray differs greatly in engine and airframe; the most obvious alteration is the increased size of the rear fuselage necessitated by the afterburner, and the tail-pipe nozzle, wing fillets and fin root have also been reshaped. There is every reason to believe that the machine is supersonic, although such a claim has not been made officially.

The Skyray's speeds on its four timed runs were, in order, 746.075, 761.414, 746.503 and 759.499 m.p.h. If these figures are accurate there seems little chance of Britain regaining the record at any time in the forseeable future, for by the time we have a faster aircraft, the U.S.A.F. will almost certainly have set a record that will be quite beyond our reach. S/L. Neville Duke is reported to have said that the Hunter could not be pushed beyond the Skyray's figure, and Lt-Gen. Sir Ronald Weeks, chairman of Vickers-Armstrongs, has made a similar pronouncement in the case of the Swift. The Swift F.4 is now back in this country after two weeks in Libya. The Hunter prototype WB 188 was considered well worth sending to Edwards A.F.B., California, for a further try in good conditions, but it is doubtful if the Hawker Siddeley Group will now carry this plan into effect.

THE LAST SIX ATTEMPTS

Pilot	Date	A/c.	Speed (m.p.h.)	Temp. deg F	Speed of sound (m.p.h.)	Mach no.
Maj. Johnson ...	15.9.48	F-86A	670.98	70	768	0.873
Capt. Nash ...	19.11.52	F-86D	698.5	77	775	0.901
Lt-Col. Barns* ...	16.7.53	F-86D	715.7	105	794	0.903
S/L. Duke	7.9.53	Hunter	727.6	74	772	0.944
Lt-Cdr. Lithgow ...	25.9.53	Swift	737.3	102	796	0.926
Lt-Cdr. Verdin ...	3.10.53	F4D	753.4	98.5	792	0.964

* Lt-Col. Barns' record is unconfirmed.

As Salton Sea is some 240ft below sea level the white-painted Skyray (top) was itself flying below sea level. It was piloted by Lt-Cdr. James Verdin a 35-year-old U.S. Navy pilot, seen with Douglas test-pilot Bob Rahn,

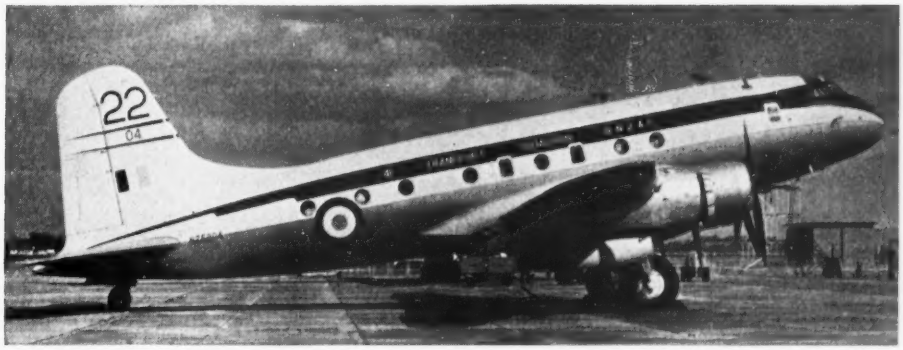
There seems little doubt that we now have the full list of subsonic world air speed records, for whoever seeks to better Verdin's figure must be prepared to fly faster than sound. This is straightforward in a good mount at high altitude, but raises a host of problems when attempted near the ground. There is one aircraft now flying which might attempt the feat—North American's F-100 prototype, or Super Sabre, now on U.S.A.F. Phase 2 testing at Edwards. If timing apparatus can be devised capable of withstanding intense shock-waves—to say nothing of the human observers—we may see a supersonic figure established this year. From then on, stability and control problems should take second place to those of kinetic heating and the difficulty of obtaining sufficient thrust.

Whatever the future has in store we—Fighter Command in particular—may take heart in the knowledge that both our fine new supersonic fighters have held the world speed record; and with them we may couple the names of Sir Sidney Camm (the Hunter's designer) and S/L. Neville Duke, and Mr. Joe Smith (who designed the Swift) and Lt-Cdr. Michael Lithgow.

Helicopters' Unique Work

IT is a pity that all the members of both Houses of Parliament and, more particularly perhaps, senior representatives of the Treasury were not among the several hundred guests of the Westland Aircraft company at the Savoy Hotel, London, last Monday evening. The occasion was a party and the showing of two films in colour which Mr. William Courtenay (who also provided a most interesting commentary) has recently brought back from Korea and Malaya. Both were concerned with the amazing work which has been undertaken by helicopter squadrons, particularly in the rôles of rescue and communications aircraft. One could not but be deeply impressed by the day-to-day tasks which British-manned helicopters (mainly Naval S-55s) are undertaking in Malaya, and regret that there is but one squadron available to do this vital work.

This country has fallen far behind America in the production and employment of helicopters. The three Services are, we believe, now aware of their deficiencies in helicopter squadrons. In spite of the many other commitments money must be found



AT LONDON AIRPORT: (top) speed-section contestants, right to left—Canberra P.R.7, Canberra P.R.3s (R.A.F.) and Canberra 20s (R.A.A.F.); (above, left) extra tanks (1,300 gal) in the Viscount fuselage increase its capacity to 2,800 gal. (Above) a quick re-fuelling and turn-round as part of the Viscount training. (Left) the R.N.Z.A.F. Hastings. (Below) K.L.M.'s DC-6A.

"Flight" Photographs

for the development and manufacture in this country of many more of these machines.

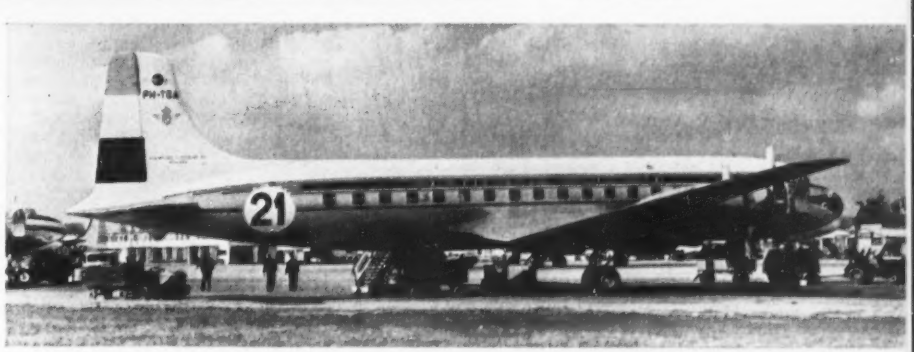
They're Off

AT the time of our going to press, the eight starters (out of 19 original entries) in the England to New Zealand Air Race were assembled in readiness at London Airport. By the time this issue appears, the race will be in progress; at 4.30 p.m. yesterday the Duke of Gloucester was to have given the signal for entry No. 21, the DC-6A of K.L.M., to commence its take-off run and so begin the 12,000-mile contest.

The final number of entrants was regrettably low, due both to a disappointing initial response from foreign air forces and airlines, and to several last-minute withdrawals. Since our article last week four further withdrawals reduced the starting number to eight.

These withdrawals were, in turn, the Lockheed 18-56 "Hudstar" of Rausch Aviation (reportedly due to Soviet refusal for it to fly its planned northern Great Circle route), the R.A.F. Valiant (owing to the lack of time for long range tests), Captain Woods' Mosquito (due to lack of financial backing) and S/L. Oates' Mosquito, which made a forced landing on the south-west coast of Burma while flying from Perth to compete in the race.

A seven-stage route had been declared by B.E.A. for the Viscount, which is expected to complete the journey in some 45 hours. K.L.M., whose DC-6A seems a probable winner in the transport handicap section, gave no information on their route. The five Canberras in the speed section should have a close race, with the P.R.7 a likely winner, and should take little over 24 hours.



"FLIGHT" INDEX

THE index for the January-June, 1953, volume of *Flight* is now available from the publishers, Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Prices, including return postage, are: Index, 1s 2d; with binding case, 6s 5d; binding reader's copies, including supply of index, 18s 10d.

The nine visiting J.29s lined up on arrival at Waterbeach, Cambridgeshire. The number 13 signifies the Swedish Air Force wing to which they belong. Inset (left) is the squadron badge, crest of the city of Norrköping.

"FLIGHT" PHOTOGRAPHS

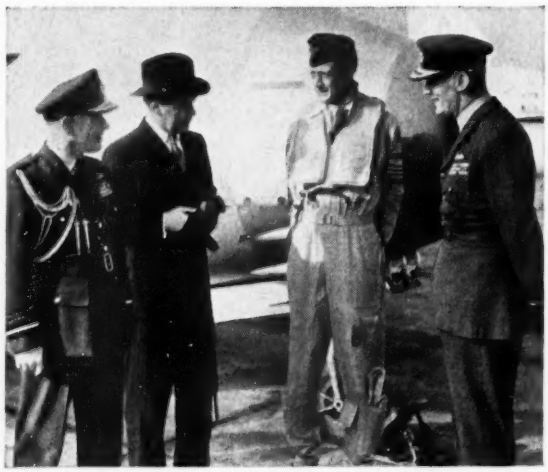
GOODWILL ON SWEPT WINGS

Saab J.29 Squadron begins a Week's Visit to R.A.F. Waterbeach

SINCE the end of the war, exchange visits between the Royal Swedish Air Force and the Royal Air Force have taken place fairly regularly. R.A.F. aircraft, from Coastal and Fighter Commands, paid goodwill visits to Sweden in 1947, 1948 and 1949; and fighter squadrons of the R.S.A.F. returned the compliment in Britain in 1948 and 1950. On Thursday of last week, October 1st, the third Swedish fighter squadron to visit this country touched down at Waterbeach in Cambridgeshire to begin a seven-day visit to this country. They were greeted on their arrival by the Chief of the Air Staff, Air Chief Marshal Sir William Dickson, the A.O.C-in-C. Fighter Command, Air Marshal Sir Dermot Boyle, the Swedish Ambassador, Mr. Günnar Hägglöf, and the Swedish Air Attaché.

The Saab J.29s were to be escorted by two wings of Meteors, and exactly on time the first formation of aircraft appeared on the horizon and were identified as two groups of four Meteors escorting a pair of J.29s. Close on their tails followed a group of three and a group of four J.29s, each escorted by Meteors. As the latter broke away to return to their home stations the Swedish machines wheeled round to join the circuit for stream landing. They made their approach straight and fairly fast—their speed appeared to be in the region of 140 knots—and with a comfortable space between aircraft. All used a good deal of power and, after a not inconsiderable "float," touched down in approximately three-point attitude. Most of the pilots then raised the noses of their aircraft to a point where the tail-pipes appeared to be practically touching the ground. When the nosewheels touched down again the apparently powerful brakes pulled up the J-29s comfortably in time to turn off at the runway intersection, after a total ground run of about 1,800 yards.

On taxying in, the aircraft were marshalled on to a line of chocks and the pilots climbed out to be greeted by the welcoming party. After Customs clearance, they were escorted to the officers' mess for tea. In order of landing, the J.29 pilots were: Col. F. R. Cervell (commander), Maj. A. T. E. Jung, Lt. S. Dalsjö, Lt. H. Hansson, Lt. P. O. Nilsson, Lt. P. O. Fogde, W/O. Henriksson, P/O. P. O. Olemyr and W/O. Brunzell. The Junkers Ju86 and DC-3 supply aircraft, which arrived later, were flown respectively by Lt. O. Wang and Capt. N. Hellquist. The J.29s had come to Waterbeach from Angelholm in Sweden *via* Twente in Holland in a flying time of approximately 1 hr 20 min.

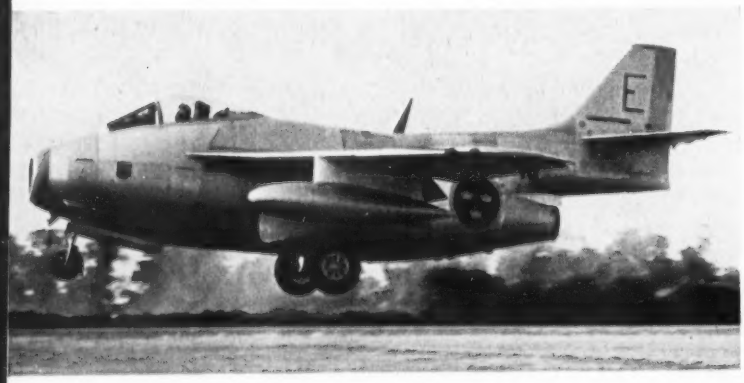


Air Chief Marshal Sir William Dickson, C.A.S., and Air Marshal Sir Dermot Boyle, A.O.C-in-C. Fighter Command, welcome Col. F. R. Cervell. The civilian is the Swedish Ambassador, Mr. Günnar Hägglöf.

The Saab, on close inspection, proved to be a remarkable machine. It has, in fact, the reputation of being the third best fighter in the world and the first European swept-wing fighter designed and produced in quantity since the war. Strangely enough, it was built for, and is flown solely by the Swedish Air Force and very little has been heard of it outside that country. In design it is very advanced, especially when one remembers that it was first flown in September 1948; in construction it is outstanding for fine workmanship and robustness; for its appearance it has justly earned the affectionate nickname "flying barrel."

For purposes of description it can conveniently be dealt with in two sections, the fuselage and the flying surfaces. Everything, in fact, except rockets and wing tanks, is accommodated in that great fuselage, which swallows up engine, undercarriage, fuel tanks, armament and the pilot's cockpit like the belly of the Trojan horse. The 25 deg swept wing, the variable-incidence tailplane and the angular fin and rudder are dwarfed by the massive structure they support and control.

First to attract the attention on approaching the J.29 is the very high quality of the skinning. Every rivet is ground flush with the surrounding skin, which is of heavy gauge with no paint finish at all. The units housed in the fuselage fit as in a jigsaw puzzle within the moderately flowing outlines, the whole being disposed about the completely straight engine air ducts. In the lower half of the fuselage, from front to rear, the twin landing lights, nosewheel, four small-calibre cannon—apparently of 15 mm bore—the



A J.29 holding-off before touch-down at Waterbeach.

main undercarriage units, dive brakes and the engine, are all mounted below the wing level. Above the wing the pilot's cockpit is positioned forward of the leading edge, with fuel tanks, radio and the tail empennage over and aft of the wing. Beside the engine intake duct, and level with the pilot's cockpit, two ammunition tanks are stowed on each side.

Though stressed to take some of the tail loads in flight, the lower fuselage behind the main wheels is completely removable for engine access. A series of small subsidiary air intakes disposed in this region are of the flush type, but not of N.A.C.A. configuration. Attached to the nosewheel mudguard of each aircraft is a small wire earthing-wick. The main wheels, which retract forwards into the fuselage and appear to be fairly softly sprung, are equipped with large tyres and single-disc brakes suitable for operation from grass fields. The pilots said they experienced no troublesome rolling due to the narrow track, which is, in fact, only 7ft 2in—this despite an apparent lack of aileron control at approach speeds.

The cockpit, finished entirely in green, is excellent in layout. The pilot sits on a comfortable cushion in the Swedish-designed ejection-seat with his feet very high on the rudder pedals. His controls are all ready to hand, his instrumentation commendably simple and clear, and forward visibility through the long, sloping windscreen is good. The gunsight, apparently of the English gyro type, is, however, non-retractable. The hood, a one-piece blown plastic structure with metal edges, can be manually wound open or shut from outside, a Yale-type lock (a thoughtful provision) being fitted on the folding winding handle. No means of access to the cockpit was evident at Waterbeach; the pilots themselves scrambled in *via* the wing tanks and the wing.

The pilots' flying suits were of fawn-coloured cloth with a liberal selection of leg pockets of various shapes (with the feet high on the rudder pedals these would be easily accessible in flight). On the left shoulder Swedish Air Force insignia were carried, as well as very large rank-badges in blue and gold. Normal shoes and American-type Mae Wests were worn. G-suits were also "betrayed" by the cloth-covered air tubes trailing from hip pockets. With this modern equipment, however, only a normal cloth flying helmet and heavy rubber face mask were used, but the ejection-set head-rest is so hollowed out as to provide ample protection for the head from the rear. The pilots' fawn-coloured clothing was in each case set off by a bright red neck scarf.

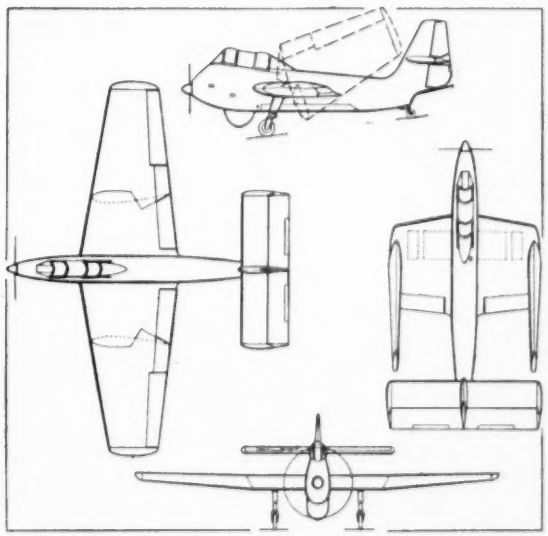
The wings, with their 25 deg of sweep, appear thick by modern standards, but have completely smooth surfaces. At each wing-tip, forward and rearward navigation lights are fitted, with two chromium-plated electrically heated pressure-heads—static to port, dynamic to starboard. Small, simple flaps close to the fuselage are followed by long, tapered ailerons. These have reinforced trailing edges and a 6in anti-snaking strip, with small trim-tabs adjustable on the ground. Control is through an irreversible power system for ailerons, but normal for other surfaces. Automatically extended slots are fitted to each wing tip, and these lock "in" above circuit speeds. Besides the wing tanks, which appear to be of about 70 gallons' capacity, fittings for four rocket rails were in evidence under each wing root.

Swedish guests. (Left to right) Lt. S. R. Dalsjö. Lt. H. B. Hansson, P/O. R. O. R. Olemyr, Col. F. R. Cervell, Lt. P. O. Nilsson, Lt. P. O. Fogde and Maj. A. T. E. Jung.

The J.29 appears to carry a single radio aerial on top of the fuselage. It is possible, however, that further aerials are buried in the base of the fin and alongside the cockpit. The tailplane, which has electrical two-speed incidence control, carries a small straight elevator. This and the rudder are both mass-balanced, and each has trim-tabs.

The J.29, although bulky in appearance, seems to handle well in the air. Its rate of roll was estimated to be considerably higher than that of the Meteor, but not quite up to the extreme standard set by the Sabre. It was, however, impossible during the Waterbeach ceremony to judge their performance compared with that of the Sabre or Meteor. On Tuesday last the J.29s were due to give a flying demonstration for the squadrons based at Waterbeach; on this occasion such a comparison might be possible.

FOR THE F.A.A. : THE SEAMEW A.S.1



First-released drawings of Short's new anti-submarine prototype, a production-order for which is now in hand. Power plant is the Armstrong Siddeley Mamba driving a light-alloy Rotol airscrew.

AVRO CANADA ACQUIRE ORENDA WORKS

IN Toronto on September 29th, Mr. Crawford Gordon, president of A. V. Roe, Canada, Ltd., disclosed that his company had acquired from the Canadian Government the vast gas-turbine factory at Malton, Ontario. It is in this plant, officially opened on September 29th, 1953, that the company has been building Orenda engines for the CF-100 (the first Mk 4 versions of which are shortly due for delivery) and Orenda-Sabre. Situated about a mile away from the Avro Canada factory, alongside Malton Airport, it has for the past year been operated by the company on a management basis for the Government; they will now take it over, together with two large hangars, several ancillary buildings, and the land on which these buildings stand, at a cost of some 17½ million dollars (about £14,085,000).

Confirming the news, Sir Frank Spriggs, managing director of the parent Hawker Siddeley Group, said that the project was in keeping with the policy of making each member-company self-contained. Describing the works as "the most up-to-date aero-engine factory in the world," he added: "It is superbly equipped in every way including modern and fully silenced test-houses; research, design, experimental and development shops; an elaborate compressor-testing plant; and, indeed, every facility necessary for the successful development and production of large quantities of gas turbine engines of all types and sizes."

Hawker Siddeley's chairman was speaking on the eve of his departure, on Wednesday of last week, for Canada and the United States. Travelling with him in the *Queen Mary* were Sir Roy Dobson (Avro managing director and Avro Canada chairman)—"largely responsible for the successful negotiations with the Canadian Government"—and twelve senior technical executives forming the Groups design council. They are first visiting Avro Canada, and are then going on to the United States for high-level discussions with the U.S. Air Force and Navy, and the British Joint Services Mission.

HERE AND THERE

LOW DOWN HIGH UP: On its recent demonstration visit to Switzerland, this Bristol Sycamore Mk 4 made a landing on the Sanetsch Pass (6,600ft), as seen here; it also gave water-rescue demonstrations on Lake Thun. It was piloted by Capt. Peter Wilson, and the demonstration party was led by Mr. White-Smith of the company's helicopter sales department.

Hurrying to School

BRINGING 29 aircrew-members for Comet training in England, an R.C.A.F. Comet flew last Sunday from Goose Bay, Labrador, to London Airport in 5 hr 26 min, an average speed of 480 m.p.h.

Fouga Magister Adopted

IT is announced in Paris that, on the advice of the Conseil Supérieur de l'Air, and with the agreement of the National Defence Minister, the French Air Ministry has adopted the Fouga CM170R Magister for the training of jet intercepter pilots. The machine was illustrated in our Paris Show report (July 3rd).

Brabazon Last Rites

THE Brabazon 1 and the partly erected Brabazon 2 are now being broken up for scrap. The two aircraft, less their interior equipment and instrumentation, have been acquired for this purpose by R. J. Coley and Son, of Hounslow, whose managing director, 75-year-old Mr. R. J. Coley, started his aircraft scrap-metal business just after World War I. Jigs used in the construction of the Brabazons are also included in the deal. The sum involved has not been disclosed, but the value of the light alloys has been estimated at £10,000.

U.S. Malta Reinforcement

THE number of American aircraft stationed at Malta, G.C., is to be augmented. The increase is necessary, according to a Colonial Office statement issued last week, "in order to provide adequately for the defence of the island and of the Central Mediterranean." The statement adds: "This will involve some redistribution of the U.S. and British Air Forces on the various airfields, with a certain amount of consequential construction works." A Colonial Office spokesman said later that no new development in policy was involved; American aircraft used the R.N. air station as "lodgers." There is normally a U.S. Navy Neptune squadron on the island, together with Albatross Triphibian air/sea rescue aircraft and various transport machines.

British Messier Appointment

IT is announced that, as from October 1st, Mr. H. G. Conway has resigned from the post of technical director and chief engineer of British Messier, Ltd. Mr. L. G. Fairhurst has been appointed as the company's chief engineer; he will continue to hold a similar post with Rotol, Ltd.

For Speeding Production

RELATING to some of the main exhibits at the recent Mechanical Handling Exhibition, a documentary colour-film, with sound commentary, has been produced for screening by technical organizations, engineering training schools and similar organizations. Entitled *Mechanical Handling*, it forms a pictorial record of the exhibition and also provides an excellent insight into the principal types of British equipment now available. The film is available on loan, free of charge, from the journal *Mechanical Handling*, at Dorset House, Stamford Street, London, S.E.1.

Ferried by Fields

FIVE Vampire Trainers for the Indian Air Force recently arrived at Cawnpore from Hatfield—the first of a series of delivery-flights of these aircraft to the I.A.F. for which Field Aircraft Services, Ltd., have been given a contract. Mr. H. St. G. Bond, of Fields, led the first consignment.

Avro Canada Post

THE appointment is announced of Mr. W. R. McLachlan as general manager of the gas-turbine division of A. V. Roe Canada, Ltd. For the past 18 months he has directed the electronics division of the Department of Defence Production, in which post he has been on loan from the John Inglis Co., Ltd., of which he was vice-president. The Avro Canada gas-turbine division which he now takes over includes the Malton, Ontario, factory which (as recorded on page 495) the company has acquired from the Canadian Government.

Motor Show Information

OUR readers who are motorists, or otherwise interested in cars, may care to note the following dates, on which the special Motor Show numbers of our associated journal *The Autocar* will appear: October 16th, Show Guide (including complete buyers' guide to 1953-54 models); October 23rd, Show Report; and October 30th, Show Review. The marine section of the show is being fully covered by *Yachting World*, in the October (now on sale) and November issues.

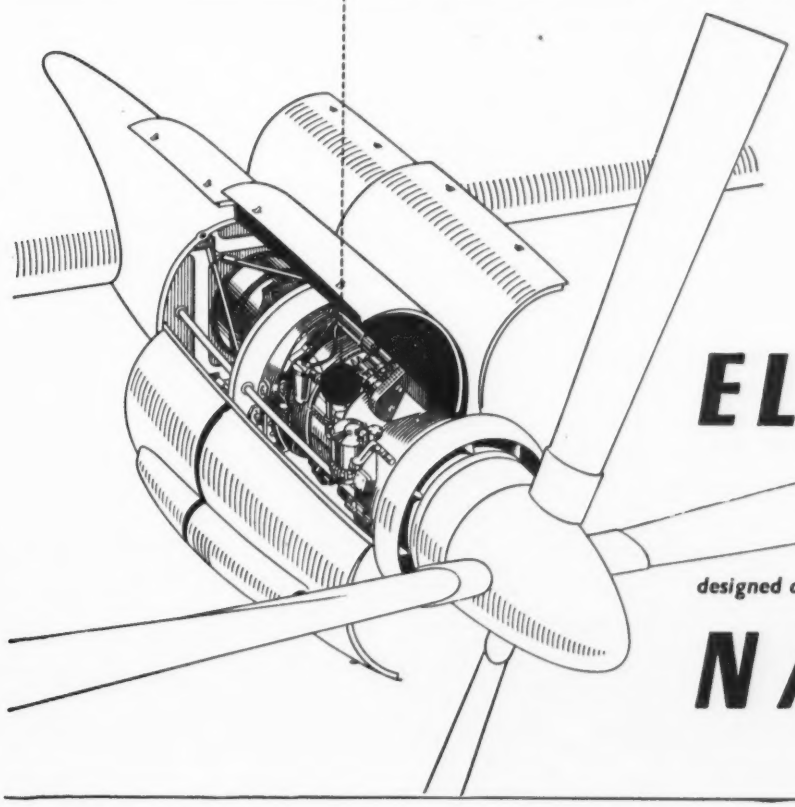
Bristol Rotocoach Development

COMMENTING on "recently published statements implying that the Bristol 173 Mk 3 Rotocoach helicopter will be delayed in reaching operational service" [presumably a reference to B.E.A.'s recent annual report], the Bristol Aeroplane Company has issued a statement saying that the planned programme for the Rotocoach is unchanged—"It is the company's intention to proceed steadily and progressively with development of the aircraft to normal operational standard, and to offer it for world sale with a full Certificate of Airworthiness in the latter half of 1956".

OUTCLASSED by the Hunter and Swift and by a number of American and French fighters now in production, the Mig-15 is, nevertheless, an object of interest. This example, photographed at Kimpo, near Seoul, was flown in by North Korean pilot Noh Kensun Suk. The fairing for the 37 mm gun is prominent under the nose. A number, or insignia, appears to have been painted out.

Access to economy

The economics of maintenance are highly susceptible to variations in accessibility. In the design of the Eland maintenance facilities have been carefully studied, and the extreme compactness of this high-rated unit has been achieved in a manner which aids access to all points subject to periodical attention.



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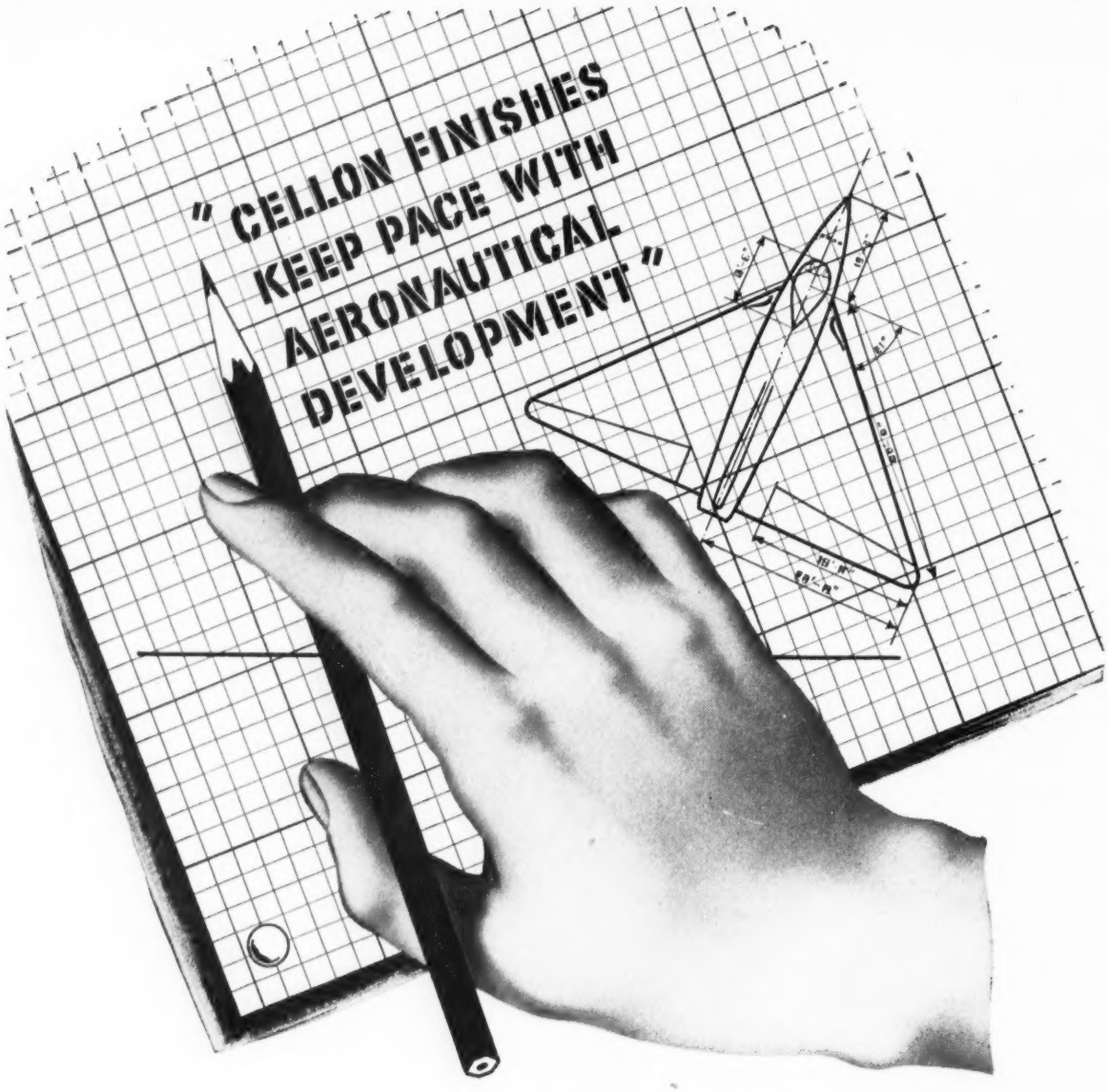

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Elegance over Dunstable: An Olympia, seen from the soaring ridge. At the foot of the hill, the London Gliding Club's landing site and clubhouse.

By
KENNETH OWEN

ENGINES—ARE THEY NECESSARY?

Some Reflections on Attempting to be a Bird

SILENCE is a beautiful thing. Combine this beauty with the exhilaration of flight, and the result should be worthwhile indeed. Years ago, some such thought was vaguely responsible for my original desire to glide, a desire whose strength was matched only by my conspicuous failure to do anything at all about it—until August of this year. At that time the London Gliding Club expressed their willingness to try to teach me to glide; an optimistic gesture, and a sporting challenge which I accepted with alacrity and a small dry Martini.

My previous gliding experience was zero. All my aviation had been achieved with the aid of one or more noise-producing devices, known as engines, which caused fans to rotate at the front end of the flying machine. I had therefore become conditioned to the continual droning of these inventions; and, indeed, silence from one of them would normally be the signal for a descent to be made on to the ground. Thus a certain amount of reorientation was first needed before I could really believe in the new philosophy of being pulled at the end of a long string into the air, there to be cast off with no motive power other than gravity. The prospect of innumerable dead-stick landings, extending on into eternity, was an equally novel concept.

In the past I had, however, been aware of the existence of this method of progression. The sight of a skeleton-framed primary glider circling and descending rapidly, the exposed pilot seemingly suspended in space, had failed to inspire me. I had not taken up gliding at that time, and the sight of the primary caused merely a wish for things to stay that way. The recollection of polished work in Olympias by Goodhart, Stephenson and Lee at various air displays in this country, and of formation gliding at Soesterberg —which I still believe to have been impossible—reminded me, nevertheless, that sailplane flight could be an inspiring thing. This opinion was confirmed by my friend and one-time lecturer, Alan Yates (himself an experienced Olympia pilot), and my mind was made up. I would follow in the footsteps—or the thermals —of Philip Wills, and try very hard to be a bird.

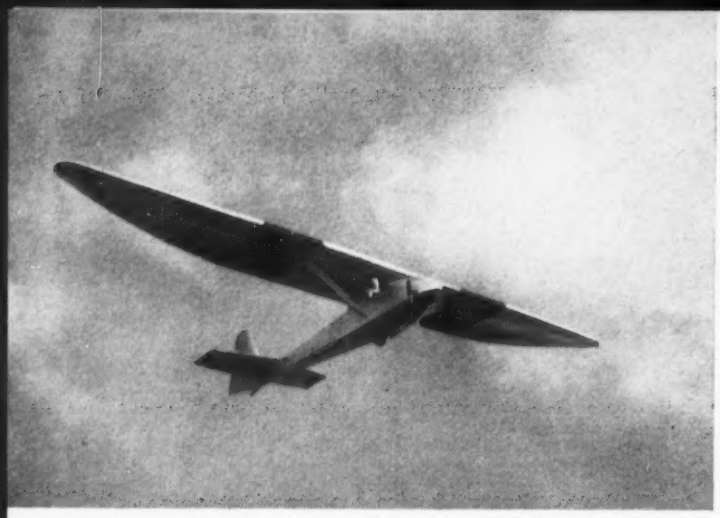
THE author, a member of our editorial staff, is an ex-Fleet Air Arm power pilot who has flown the "Flight" Gemini on many of its visits to clubs and air displays this season. Having spent part of his summer leave learning to glide, he gives in these pages some impressions of his conversion to engineless flight.

Attaching myself to the second half of one of the London club's two-week training courses, I met my instructor, bad weather and a new philosophy on my first day at Dunstable. The philosophy is one of calm patience together with a willingness to push or pull gliders long distances from the point (A) where they land to the point (B) they are launched. (It subsequently transpired that most glider pilots can in fact make (A) tend towards (B) on the majority of occasions, but pupils in the two-seater are inclined to make interesting, rather than accurate, approaches and landings.) My instructor was to be John Simpson, a schoolteacher by profession and an experienced sailplane pilot who habitually spends many weeks of his summer vacation teaching people to be birds. Half the course-members were his responsibility, the remainder being in the care of one George Scarborough, the club's full-time flying instructor, whose flying skill was equalled only by his unique ability to ensure in picturesque language that pupils were not left entirely unaware of their own shortcomings.

"Power pilot did that," commented George soon after my arrival, pointing to the splintered wreckage of a Tutor in the club hangar. No reply was expected; nor was one given.

First impressions from the ground of the gliders in the air were of the steep launching angle (as if lying on one's back in a lift going up?) and the shallow angle of bank, compared with powered aircraft, as they turned—this latter, on reflection, being presumably due to their slower air speed. Watching from the launching point, one was fascinated from the start by the rear end-on view of the

The Kirby Tutor, slightly obscured by the author bewildered yet triumphant after his first engineless solo.



The faithful barge, two-pew or plain T.21A; an admirable vehicle for dual instruction. George Scarborough is at the controls.

ENGINES—ARE THEY NECESSARY? . . .

high-pointing machine, with two head-and-shoulder silhouettes, one on either side of the wing-supporting central pillar, rising from the wide, boat-like hull of the fuselage of the T.21A (so appropriately known as "the barge"). Occasionally, a pipe-smoking occupant of the starboard seat would be seen to lean out and knock out his pipe on a convenient strut. . . . Indeed, power flying was never like this.

Another intriguing aspect of gliding, appreciated very early in the game, is that observers on the ground can hear quite distinctly what an instructor in the circling "two-pew" is saying to his pupil —and, of course, equally distinctly any reply the pupil dares to make. This can prove acutely embarrassing to the airborne pupil, as precise details of his incompetency of pilotage are thrown to whichever of the four winds is not blowing in his face at the time, and carried with crystal clarity to the delighted ears of those below. Later experience proved, incidentally, that in fact you heard the instructor more clearly when he was in the air and you were on the ground than when you were both in close proximity with one half of a T.21 strapped to your respective backsides.

Soon came the time when I had to cease watching everyone else flying and actually to sample the real thing myself. Observation of the T.21's activity since my arrival had pointed to the fact that it was, in spite of its appearance, airworthy, and capable of at least making a circuit and landing in the same general area from which it was launched. This knowledge did something to relieve the doubt occasioned by the sight of extremely primitive-looking stick and rudder pedals, a small wooden sphere attached to a wire (surely not for flapping the wings in an emergency?), a panel of only three instruments, and no seat—just a slightly raised portion of the floor. The central instrument, between the altimeter and the A.S.I., was intriguing, and apparently consisted of two thermometers vertically mounted. This, I was informed, was actually a variometer, the gliding equivalent of a rate-of-climb indicator.

Installed in the hollowed-out space (laughingly called a cockpit) between the nose and the wing pillar, I strapped myself in and prepared for the pre-launch check-off list. The mnemonic for this was "Scrubcat," referring in turn to Straps, Control movement, Release (so my small wooden sphere released a cable, not flapped a wing?), Undercarriage (none fitted) or Uncover pilot, Brakes operative, Canopy fastened, Altimeter set, and Trim (none fitted). This formality over, a "one up" call to the batsman resulted in the signal to "take up slack," followed by "two," otherwise "all out."

The wire tightened, and we began to move forward over the ground, rather more smoothly than I had expected. Then we were rising into the air, with an almighty rushing noise and the feeling of being pulled face-first through a howling gale (although the unabated steady nature of the gale gave one rather the impression of being a model, suspended at a high angle of attack in a high-speed wind-tunnel). My streaming eyes just managed to perceive that the nose seemed very, very high, before my instructor pushed the stick forward, released the cable, and handed over the controls to me.

I commenced the circuit with a turn to the right. Any belief I might have held that turning a glider was identical with turning a powered aircraft was quickly dispelled as slow-speed effects and aileron drag played their part. The application of moderate right bank immediately caused the nose to swerve to the left—an interesting phenomenon, but not what was desired. Much and early rudder was obviously needed, at least to begin the turn. A general sloppiness of the controls was apparent, and so we slopped around the circuit, as if steering a barge sideways, forwards, allways across a many-current river.

My clumsiness at the controls was heightened by the lack of any indication (to me) of whether I was flying accurately or not: indeed, the machine did not seem to *fly*, but rather to slide and wallow erratically, though in the right general direction. Rather disconcerting at first was the impression that what one did with the controls bore little relation to the subsequent behaviour of the aircraft.

After a blundering sort of downwind leg (with one highly suspicious eye on the A.S.I. needle, apparently frozen rigid at 30 m.p.h.) I began to turn crosswind, but was too high for a straight-in approach. My instructor took over and, showing how it should be done, made a wide S-turn before coming in to a smooth landing. It seemed that landing judgment would be easier in gliders; the ground did not rush up suddenly, as with powered aircraft, and one felt nearer to it and better able to judge one's precise height in the final stages just before touch-down.

This, then, was gliding. A bewildering, hectic three minutes spent slithering around a circuit with a howling gale blowing in one's face. If only because it *was* bewildering, and because one wanted more fully to understand it, there remained the desire for more—a desire that soon developed for me, as it has for many others over the years, into an answer to the peculiar, compelling fascination of the sport of gliding.

Sunday was an extremely busy day, and the T.21A, being the only two-seater available at that time, was in great demand, so that I was unable to obtain a second circuit. Instead, I absorbed the atmosphere of a good-weather Dunstable Sunday: the colourful, high-performance machines questing and circling up from the hill in search of thermals; the lowly beginners hesitantly lunging around an erratically flexible circuit in the barge; and the outside audience changing from a lone early-morning equestrienne reining-in her mount at the foot of the ridge to the air-minded picnicking groups who covered the afternoon hillside.

Circuits and Bumps

The following day, on our first circuit, I was allowed to perform the take-off, dimly remembering the briefing "Let her get a little way up from the ground, then gradually press back on the stick." This I did. "That's right, higher," advised John Simpson, just as I was about to keep the nose where it was. Hesitantly, a little more back-pressure. "Good. Higher." *Higher?* Oh, well, why not, the whole thing was ridiculous, anyway. Higher still, and then with the stick right back the nose eventually began to pull slowly yet firmly down—we had arrived at the top. Forward on the stick before release—but not enough, for there was a slight jerk as we came off the wire—and then a right turn into the circuit again.

On the downwind leg, we came level with the launching point fairly quickly, for the wind was strong, but I was told to turn in sooner than I intended. The strong-wind technique for elementary pupils is apparently to fly a crosswind beat just behind the boundary, from which one is certain of getting in at any point, rather than run the risk of being carried too far downwind and not reaching the field.

A startling and revolutionary procedure was then suggested (or rather ordered) by my instructor as a preliminary to the landing approach. One was not to decrease speed from what might be termed "normal cruise" for the landing, as on a respectable powered aircraft; on the contrary, one *increased* speed. Pushing my mental reservations firmly aside and the stick firmly forward, I increased speed from about 30 m.p.h. to a relatively breathtaking 40. Subsequent thought on the matter approved the new concept; as one is flying normally very near the stall, it is as well to have a little speed in hand when landing, in view of the marked wind-gradient effect near the ground.

My actual landing was no more than adequate. My powered-aircraft training reared its ugly head—as indeed did the T.21—as I brought the machine in, very smoothly, on its tailskid. "Hmm, yes," commented J. S., "most power pilots seem to do that."

Subsequent circuits indicated further faults to be cured: a tendency to fly too slowly, and with one wing low. Slowly the feel of the controls improved, though I still caught myself on occasion looking for the non-existent turn-and-slip indicator. Experience of its action at low speeds, as well as my instructor, soon taught me to ignore the A.S.I., and I had no reason to look at the remaining two instruments. One touch-down which I made very near to the launching point resulted, to my surprise, in the disapproval of my mentor, for it was thought a good thing (by the instructors if not the retrieving party) for pupils to play safe and land well into the field at this stage.

Landing on the grass-covered roller-coaster that is the Dunstable flying field is indeed an alarming prospect at first, and one feels grateful somehow for the presence of a second and more experienced person in the cockpit of the T.21. A deep, diagonal gully separates the two crests from which the launches are made, while along one side looms the soaring ridge. There are power cables,

In the groove; the author brings the Tutor in through the "tradesmen's entrance" (a conveniently clear gully approach) after a circuit.

too, but as these have been specially diverted, one should not encounter them on a conventional approach, and one soon realizes the truth in the claim that, if one can fly and land at Dunstable, then one will have little difficulty elsewhere. Especially intriguing is the experience of missing the first crest and flying (at twelve inches above the ground) down and up the sides of the gully before finally touching down on the far slope. The club member who manages to fly his Gemini on and off the field for aero-tow purposes has my deepest admiration.

On Tuesday came my introduction to ridge soaring, with about 20 minutes in the two-seater in some very bumpy hill-lift. Being able to arrest the previously inevitable sink to the ground by using the rising air over the hill was a new and thrilling experience, as was being able to overtake a raven, poised with curled wings and rising in a strong thermal. For the first time I took an active interest in the up-and-down indications of the variometer's green and red balls: in general these agreed with my own sensations, especially when the up- or down-drafts were strong, but occasionally I doubted the high rate of descent shown.

The parallel in technique and feeling with yachting was emphasized as we used the wind to crab along the ridge while maintaining height, and as I slowly began to learn the elements of hill-soaring. For the first few beats the sight of the ridge-top people and activities (a golf course and a swimming pool were prominent), seen slowly moving from a relatively low altitude, was especially novel, as was that of Whipsnade Zoo's hillside lion, penguins and polar bears.

Wednesday provided an excellent and full day's flying. My first circuit was a solo check with George in the two-seater. I realized after the event that I should have been expecting it; nevertheless, the dummy cable-break half-way up the launch came not only as a loud bang but also as a complete and alarming surprise. "What are you going to do about it?" asked George, after I had instinctively put the nose down. "A quick circuit," I replied, with more confidence than I felt. My height judgment was apparently reasonable, however, for the intention seemed an acceptable one, and its execution brought no calamity. I was now deemed safe for solo (having sampled the T.21's docile stalls and spins on previous circuits), and was about to flap—metaphorically speaking—my own wings. Indeed a proud prospect for me, albeit possibly a risky one for the London Gliding Club's Tutor.

The Tutor, externally, appeared a pleasant and conventional machine. As I inserted myself in the cockpit, however, I realized that someone had disturbed its conventionality by removing the instruments. A gliding joke, intended to frighten would-be soloists—an uncompleted D.I.—panel removed for checking? Slowly the further realization dawned that this was no joke, no incomplete D.I., no panel removed. This was deadly serious. I was actually expected to fly the thing that way.

In solemn mood I tested the controls for movement; that of the harmonium-type rudder pedals seeming quite appropriate to the dark mournful music I alone heard at that moment. In a last desperate attempt to reassure myself, I observed that neither birds nor the four other pupils who at that time had soloed on the course carried instruments, either. But then, *Flight's* Gemini did. . . .

Such reflections were cut short as the cable tightened and the Tutor began to move. Having been told that the Tutor tended to rise more steeply than the T.21A, I over-corrected and consequently climbed rather shallowly for the first part of the launch. The feel of the new machine came easily, though, and then I was at the top of the launch, as if riding an airborne steed, holding its head high in the air and with an exhilarating feeling of power, anticipation and enquiry before putting the nose down and around and into the circuit groove. Really, who wanted instruments at a time like this?

Judgment of the circuit and landing run was little different from that in the two-pew: if anything, rather easier because of the livelier response of the Tutor's controls (dare one say, more like a real aeroplane?). My main faults were again a tendency to fly too slowly in the rather strong wind and, I was told, with one wing down; and what I thought to be a rather well-judged landing on the first crest but which was deemed too near an undershoot.

The remainder of the day for the proud Tutor pilots was spent in circuits, and more circuits (with the occasional thermal circle). My second and third flights qualified me for my "A" and "B" certificates and a large round of lunchtime drinks in the bar. Of the five of us who had reached "B" stage, undoubtedly the best pilot was John Reynolds, a 16-year-old Felstead schoolboy and the youngest person on the course, whose natural ability to fly very nicely judged circuits and circles was outstanding. Incidentally, his interest in gliding had followed a landing in an Olympia by Dan Smith, the club's C.F.I., in the grounds of his school. Doing our best to equal Reynolds's nice flying were Arthur Keeler (another power pilot), Richard Godwin-Austin (a medical student), Leonidas Contostavlos (known simply as "Jim") and myself.

As circuit practice continued, we came gradually to know the Tutor better, including what to do when one "runs out of rudder" on a final turn uncomfortably close to the hill. Over-confidence and unconventional circuits were guarded against by the Damoclean threat of relegation to the two-seater should caution and good judgment not prevail. Threat or no threat, there remained an increasing fascination in the whole business of gliding. One gradually came to accept the idea of someone else sponsoring one's ascent by pulling on the end of a piece of wire—indeed this almost seemed the natural thing to do. The local topography became better known, and instructors' exhortations to "watch the lynchettes" were recognized as references not to diminutive punishments for errant birdmen, but to prominent agricultural landmarks downwind of the field.

Solo on the Ridge

The wind was directly on the hill on Friday morning, a good sign for "C" aspirants (five minutes' solo soaring was required for this certificate). After twenty minutes' dual on the hill and one Tutor circuit, we were in turn able to take the Tutor up into the strong hill-lift. This proved an exciting and satisfying experience and, even if we were not actually being birds, it was certainly the nearest approach to acting like a bird that we had yet made. "Much better than circuits" was the unanimous and understating comment on our first hill solos, each of which was of 20-30 minutes' duration.

Moving slowly sideways just above the line of the 200ft-high hill, one had time both to improve one's flying and to notice details on the ground—Dunstable town, for example, spreading below the far side of the "bowl" end of the ridge, could now be observed at leisure. With no variometer in the Tutor, thermal-seeking was neither advisable nor profitable, although one could take advantage of obvious lift by turning and crabbing back slowly in the reverse direction when it was experienced—provided one looked round for other aircraft first.

The proximity of other gliders and sailplanes over the ridge did require a sharp lookout at all times, particularly on the busy following day, Saturday, when there were often some 12 machines in the air. The slow relative motion and the ability to hover by turning directly into a strong wind lessened the hazard considerably, however, and indeed made the slow, close and sideways passing of another machine a pleasant novelty. The frequency with which another aircraft, seen from the corner of an eye to be approaching from the rear, turned out to be one's own tailplane, was embarrassing but (on the ground later) amusing. Also reported by one able-bodied "C"-man was his alarm at the sight of his own shadow on the ground being steadily approached by that of another machine, which on feverish search was nowhere to be seen (but which actually appeared some 150ft above him).

The sight of the long week-end queue for two-seat instruction emphasized the advantages of taking a full-time training course. Learning to glide at week-ends over a long period can be a slow (and, even for the keenest, a frustrating) business. By gliding, talking gliding and living gliding for a whole week or fortnight, it can be a lot of fun.

Thus, with a series of rewarding half-hour flights over the ridge, my week at Dunstable ended. I had enjoyed a good week's flying, and the companionship of experienced pilots and other learners alike; I had received a week's disgustingly healthy exercise in the open air, sore feet from retrieving, and my "C." What this all added up to was a brief first taste of the fascination—and satisfaction—of gliding.

For those whose thoughts are in the sky, there can be no finer sport. Given the wind, the sun and the sky, were engines necessary? I think not.

THE WELL-DRESSED AIRMAN, 1954

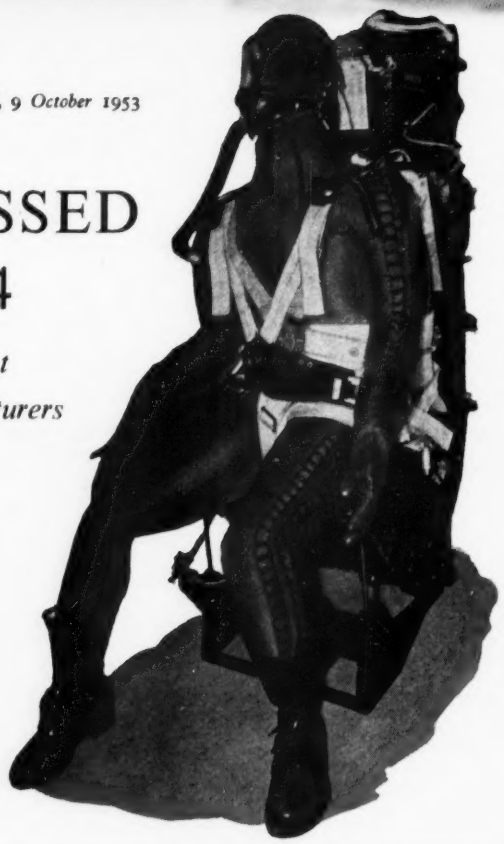
High-altitude Clothing: Recent Developments by British Manufacturers

A NUMBER of the aircraft demonstrated at the S.B.A.C. show this year are capable of operating at extreme altitudes; one, the Olympus-Canberra, established the official world's height record of 63,668ft. The new V-class bombers, amongst other types, will probably operate at heights not generally reached at present, and therefore their crews will require special equipment to keep themselves comfortable, and even alive, at these great heights.

From items of equipment exhibited in the static show at Farnborough it was possible to form a picture of how aircrew of the near future will be dressed and equipped. The days of the simple battledress, overalls and leather helmet outfit are numbered; no longer will the pilot keep cool merely by discarding all clothing save the flying suit, or warm by adding layer upon layer of woollens. He will be so girt about with breathing and pressurizing equipment that he will have to wear a specially-designed uniform to mitigate the newly acquired "Martian look."

From the research carried out in Germany during the war and in the United States and Great Britain, three methods of pressurization have emerged. The first, cabin pressurization, is already in everyday use and is sufficient for present requirements up to 50,000ft. But because of the vulnerability of the pressure cabin and the large area which must be sealed, the tendency is now to equip the pilot with a pressure suit, which offers a smaller target than the whole cabin and will also remain pressurized after the wearer has bailed out. Explosive decompression due to battle damage, or sudden ejection into outside atmosphere would, at the altitudes now contemplated, inevitably prove fatal to the pilot. The second and third methods of pressurization have therefore emerged. They are known as the partial pressure suit and full pressure suit.

The partial pressure suit is a garment which does not cover the whole body—the feet and hands are generally left free. It performs its functions by applying a direct constrictive pressure to the body in much the same way as a g-suit. It might be defined as a blend of g-suit and straitjacket which nevertheless allows the pilot full freedom of movement. The full pressure suit is in effect a tailored pressurized cell enclosing the whole body. It has, unfortunately, two major disadvantages; it is bulky and, just as all tubes when inflated become straight and rigid, so does the tubular full pressure suit spreadeagle the wearer like a paralysed starfish when pressurized. The American B.F. Goodrich Co., however, claim to have solved the problem of mobility in a full pressure suit designed by them for the U.S. Navy.



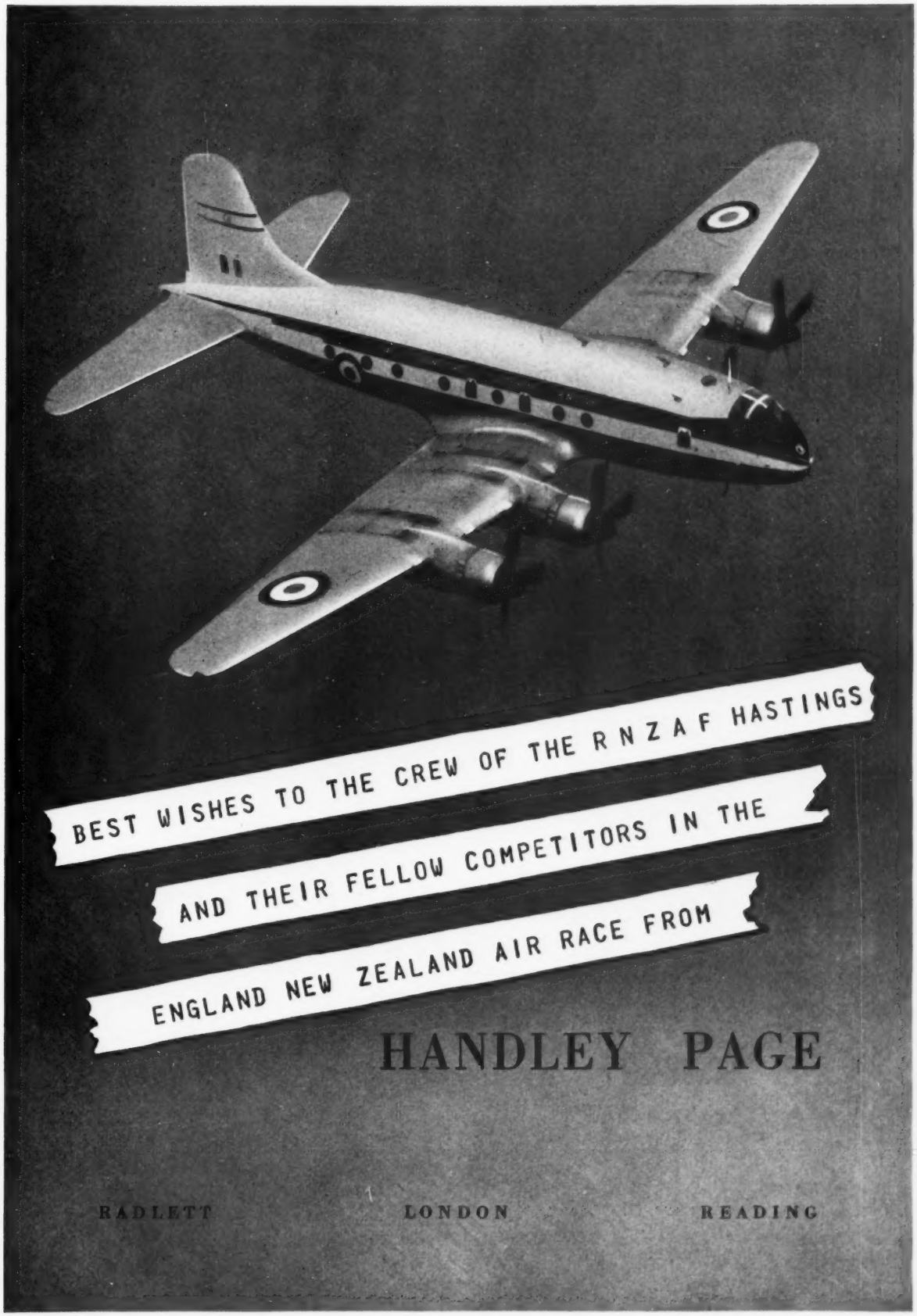
A dummy, in an ejection seat, wearing the partial pressure suit and helmet. Battledress and survival clothing would normally be worn over this suit.

Development in Britain has so far resulted mainly in the partial pressure suit, and clothing displayed at Farnborough was for this type of high-altitude gear. Altogether six new items of equipment were to be seen at Farnborough. From head to foot, these were the Thermoplastics, Ltd. anti-buffet helmet—soon to go into general R.A.F. service; the G.Q. pressure helmet, partial pressure suit, and air ventilated suit; the new battledress manufactured by Howard Flint; and new ankle boots manufactured by Frankenstein.

The anti-buffet helmet is a nylon and plastic protective shell similar to the American Lombard helmet, which will initially be worn over a modified light cloth earphone and mask-supporting helmet. In the high-altitude dress it will fit over the G.O. pressure helmet, which has integral pressure-breathing mask and

The blouse of the new battledress. The zip pockets at left are openings for air and oxygen pipes.

Cut-away and complete models of the Normalair pressure breathing demand-oxygen regulator. It is larger than the standard type, but simpler to operate.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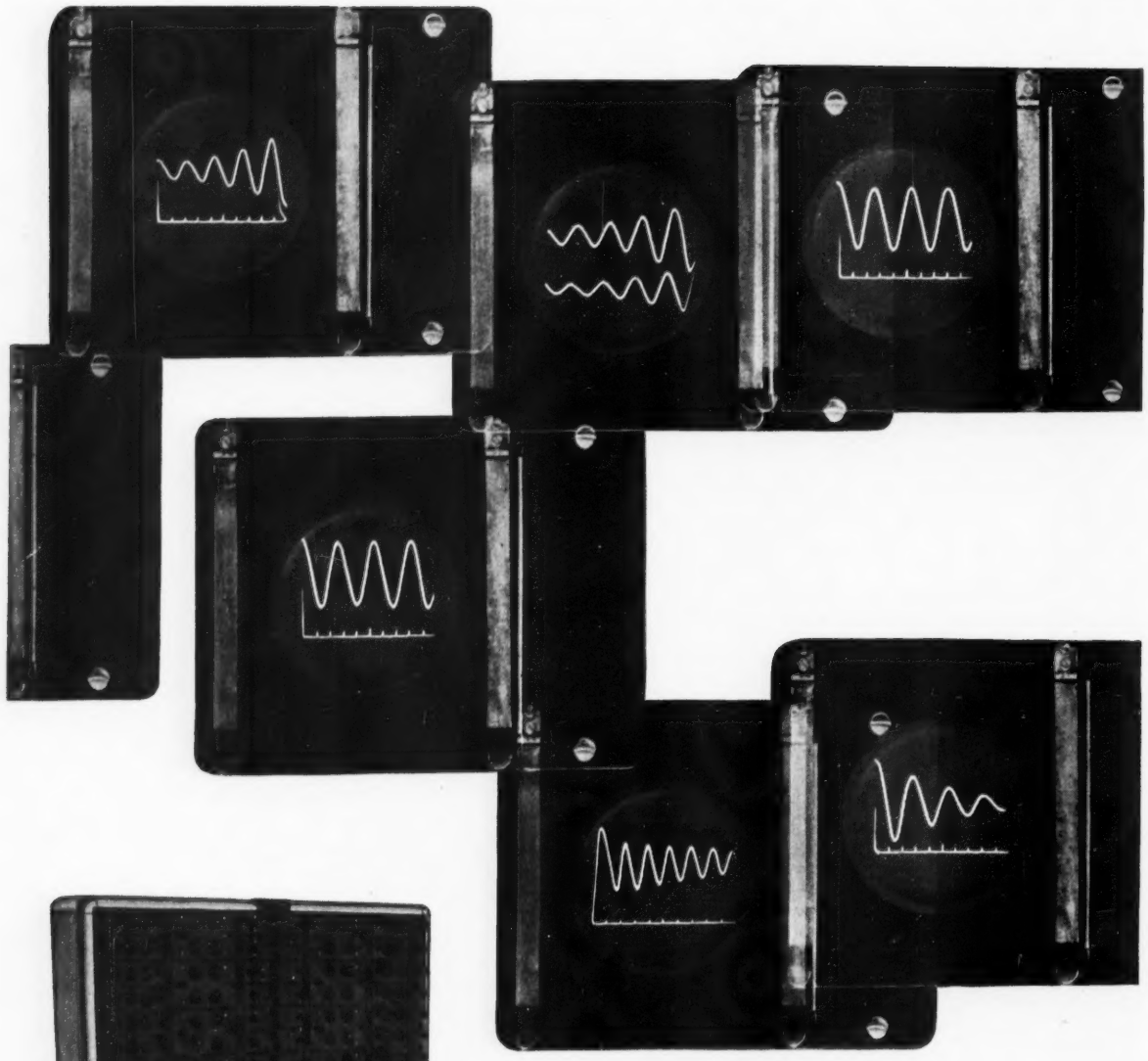

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THE WELL-DRESSED AIRMAN, 1954 . . .

transparent face-piece. The pressure helmet in its turn overlaps at the neck the main partial-pressure suit. This is made of a tough, thin nylon material, adjusted for body size by extensive lacing. Over the body and along each limb a series of inflatable tubes is held within fabric loops so that, when the tube is inflated, the suit is tightened round the body and a pressure thus applied to it.

G.Q. have developed a special cooling suit which allows the pilot to perspire freely and to keep cool beneath the partial pressure suit. Made of white nylon, the ventilating suit distributes cool, dry air to 96 points round the body through a series of vein-like black tubes, fed from a special external air supply. When, for operations in certain areas, heavy survival clothing is worn and the cockpit is heated to a temperature in the region of 160 deg F by external skin friction due to high speed, such a cooling suit will become vital, perhaps even in conjunction with cockpit refrigeration.

The new battledress is similar in appearance to the aircrew battledress with sloping zip-fastened pockets issued in small numbers to the R.A.F. last year, but differs from it in that two of the "pockets" are merely openings, and the waistline is specially designed with expanding elastic waist straps to be able to accommodate a thick layer of clothing and equipment underneath it. The new boots are of the "ammunition" type, smooth-leather soled, toe-capped and laced, but with loose soft non-adjustable anklets built into them.

The "new look" for aircrew will probably entail the wearing of the following items of clothing, from the inside outwards: one layer (to requirement rather than taste) of moderately warm, smooth underclothing, probably of the full-length variety, and socks; G.Q. air-ventilated suit; g-suit and pressure-breathing waistcoat; partial-pressure suit and helmet; expanding battle-dress; ankle boots; anti-buffet helmet; Mae West and other survival clothing and finally gloves as required.

In the aircraft, aircrew will have to make 17 connections between themselves and the aircraft; four for the seat harness, four for the parachute harness, three for the dinghy-pack, and one each for g-suit, ventilated suit, main and emergency oxygen, pressure suit and intercom. While sitting fully dressed in their aircraft at readiness, aircrew will be cooled by ground trolleys supplying cold, dry air to their ventilation suits, or possibly warm air if conditions require it. Thanks to the new battle dress, the fully dressed pilot may, if he wishes, take off his headgear and progress round the airfield in presentable condition, but one imagines that frequent stops at the cooling trolleys will be desirable in summer.

All this special clothing, however, will not appreciably increase control-work by the wearer. The g-suit is automatically controlled; ventilating and pressure suits will probably be controlled by simple on-off levers. The oxygen supply will be governed by a demand regulator of the type exhibited by Normalair, Ltd., at Farnborough. This regulator is switched "on" or "off" by a simple lever. It thereafter automatically supplies oxygen and air in proper proportion up to 10,000ft, whereupon pressure breathing is progressively applied. Two other switches allow supply of pure oxygen if desired, and emergency and pressure-breathing test facilities.

A great advantage of the equipment is that after high-altitude ejection the suit will remain pressurized and pressure breathing will continue on the normal emergency oxygen supply until descent has been made to the safe height at which the ejection seat breaks away and causes the parachute to deploy. Considerable inconvenience, however, is likely to result if any of the inflatable garments suffers a puncture; and, also, one is inevitably led to speculate on the complications which could follow watering eyes, tickling noses, sneezing and other such minor personal afflictions.

GAS-TURBINE DEVELOPMENT

Armstrong Siddeley's Chief Engineer Lectures on Eleven Years' Progress by his Company

LECTURES on technical subjects delivered to "public" audiences, rather than before members of learned societies, are unusual occurrences in the aviation world. But in a predominantly industrial area such addresses can arouse great interest and draw a full audience; and this was the case in Coventry on September 24th, when Mr. W. H. Lindsey, M.A., F.R.Ae.S. (director and chief engineer, Armstrong Siddeley Motors, Ltd.) gave a talk under the auspices of the City of Coventry Freemen's Guild. His subject, a digest of which follows, was *The Development of the Gas Turbine at Armstrong Siddeley Motors.*

Mr. Lindsey began by saying that it was difficult to place the beginning of jet-engine development, since between 1936, when Sir Frank Whittle consulted Armstrong Siddeleys, and June, 1942, when serious work was begun, only one project had been undertaken. This was the construction, in 1939, of a gas turbine for the R.A.E. In June, 1942, however, work on the engine known as the A.S.X was begun. This unit was planned with a compression ratio of 5:1 and a reverse-flow axial compressor, both these features being new at that time. It was designed to give 2,600 lb thrust for a weight of approximately 2,000 lb, and a relatively low fuel consumption. The engine first ran in April, 1943, was cleared for flight in October, 1944, and installed in the bomb bay of a Lancaster in June, 1945.

Meanwhile, there proved to be a need for a turbine engine which could be used on relatively slow-flying aircraft. A project was therefore put in hand to develop the A.S.X. as a turboprop, which eventually became the Python. The first problem arose in the design of a completely new reduction gear to provide a ratio of 8:1 at turbine speeds of 8,000 r.p.m. The design was begun in April 1944, and the engine first ran in March 1945; it was ready for flight in January 1946. A Python-Lancaster test-bed first took the air in October 1948. The comparatively small size and great power of the Python when installed in a Lincoln gave this aircraft an increased ceiling—such that several Python-Lincolns were used at Woomera for special experiments. Owing to the engine's high take-off power, it was also chosen for the Westland Wyvern, but for this purpose completely new engine controls had to be designed. When, however, it first flew in January 1949, the engine could be opened up to full power from idling in less than two seconds, and closed down again in one second.

With the arrival of the turboprop, piston-engine development ceased for the time being, and it was decided to develop a small turboprop of approximately 1,000 h.p. This project, the design of which was completed in the autumn of 1945, weighed 650 lb for a diameter of 27in and came to be known as the Mamba. The Mamba first ran in April 1946, and was cleared for flight in 1947; even after going into service it is still under development to higher power.

Since the turboprop's consumption was high at low power, and its efficiency greatest near full power, it was decided to develop the Double Mamba, a power-plant which gave twin-engine power for take-off and single-engine cruising by virtue of two independently-driven but co-axial airscrews. The design was begun in 1946, first ran in 1948, and was cleared for flight in October 1949. It had been adopted for the Fairey Gannet, which was shortly to go into service with the Fleet Air Arm.

Between 1945 and 1948, Mr. Lindsey said, development had been concentrated entirely on turboprops. At the end of 1947, however, the development of a Metropolitan-Vickers research engine was handed over to Armstrong Siddeleys. This unit became the Sapphire. After re-design as a production unit, it was cleared for flight in October 1949, at a thrust approaching 7,000 lb but with great development potential in hand. In March, 1952, it was in fact type-tested at 8,300 lb and was adopted to power the Javelin, Hunter, Vulcan and Victor. Subsequent development of the Sapphire, Mr. Lindsey pointed out, was still secret.

The next Armstrong Siddeley engine, the Viper, was designed specially for use in a target aircraft at Woomera, and first ran in April 1951, producing 1,640 lb for a weight of 350 lb. This engine was, however, being developed for many other purposes.

Such, Mr. Lindsey concluded, was the history of Armstrong Siddeley's engine development over the past ten years. He now turned his attention to the bringing of an engine to the flight installation stage.

Power-plant Development.—After brief preliminary tests, with stripping after each, an engine was subjected to its M.o.S. 25-hour tests, two of which were required before the unit was cleared for flight, initially in a flying test-bed. Reliability was then progressively improved until the unit was ready for its 150-hour test. In this arduous trial, the engine was required, *inter alia*, to run under all conditions from idling to full combat power, to complete ten hours at full take-off power, and to make over 100 starts and stops. No part was allowed to be replaced and total power-deterioration must not exceed 4 per cent. If all went well, and night running was permissible, the 150-test could usually be completed in less than ten days.

Concurrently with ground development of an engine, flight testing was undertaken, the first stage being to develop a "power-

GAS-TURBINE DEVELOPMENT . . .

plant" or what was known as an E.C.U. (engine-change unit). Thus the engine progressed from a bare machine to a complete propulsion unit. The Mamba, as installed in the Apollo, had a cowling divided into three zones. The first (the compressor) zone, contained all engine accessories and was ventilated to maintain a temperature not exceeding 50 deg C; the second (combustion-chamber) zone, was, like the first, isolated by firewalls, ventilated and provided with a double skin through which airscrew and throttle controls were led. The third (jet-pipe compartment) zone, isolated the jet-pipe and the aircraft accessory drives. Saving of weight and space was achieved by building the oil tank into the nose cowl of the nacelle. The whole oil system, including the cooler, was thus isolated in Zone 1. Only two engine controls, one for throttle and one for the isolator valve, were required.

The complete power plant, Mr. Lindsey said, weighed 1,400 lb, of which the airscrew section took 400 lb. This installation was tested in the nose of a Lancaster, and also in a Dakota.

Research Organisation.—The speaker went on to describe the expansion of the company's facilities which had taken place in association with new engine research begun since 1942. A great deal of static-test equipment had been set up to deal with development of components such as compressors and combustion chambers. Armstrong Siddeleys now had at Ansty a compressor test-rig driven by a 10,000 h.p. naval steam turbine. In connection with high-altitude flight, combustion-chamber test-rigs were developed to stimulate anything from eight times to one-tenth atmospheric pressure. Altogether, some 2,000 h.p. were now available for these combustion experiments. From a team of 14 technicians in 1942, the company's technical development staff had risen to 2,000 in 1953. Armstrong Siddeley engines, the lecturer added, were installed in the A.S.X Lancaster, Wyvern, Apollo, Balliol, Athena, Gannet, Sapphire-Lancastrian, Sapphire-Canberra, Hunter 2, Javelin, Vulcan, Victor and Short Seamew.

Future development.—Mr. Lindsey now turned his attention to the future. Military requirements demanded greater speed, ceiling and range. Civil requirements, on the other hand, at present called only for economy. Development, he estimated, could ultimately produce a 30 per cent economy in consumption for civil use. The military call for power, on the other hand, could be satisfied by three lines of development: firstly, by compressor development directed to obtaining a greater mass flow through a given size of compressor; secondly, by burning more fuel in the combustion chambers; and, thirdly, by reheat or afterburning. Compressors, he said, had nearly reached their final level of development. Combustion-chamber development was a problem mainly in metallurgy, leaving the third method, reheat, the most profitable.

For extreme-altitude operation, the rocket was necessary, and Armstrong Siddeleys were developing the Snarler and later projects. For a very small size, the rocket offered very high thrust, but at present it consumed inordinate quantities of propellant.

With this hint of the trends in future development Mr. Lindsey concluded his talk.

AXIAL-FLOW ENGINES

A Consideration of Their Lower Size-limits

By J. M. STEPHENSON

THE axial-flow compressor for aircraft engines has three advantages in performance over the centrifugal type, which make its extra cost worthwhile. They are: (1) Higher efficiency; (2) Higher pressure ratio per unit (up to 7 instead of 4½); (3) Larger mass flow and therefore greater engine-power, for a given frontal area. It is widely known that these advantages hold only for large engines, but the question is, how large? It is shown here at which point each of the above advantages is lost, and an interesting conclusion appears.

The efficiency of an axial-compressor stage falls off sharply when the average tip-clearance becomes greater than about one per cent of the blade height. But it is difficult to keep the clearance below about 0.015in without running the risk of rubbing, and this puts the minimum smallest desirable blade height at 1.5in. Of course, there are compressors with much shorter blades, but it must be supposed that there is some sacrifice of efficiency, i.e., that one of the reasons for preferring the axial type is partly lost.

To find how the blade height depends on the pressure ratio of a compressor, assume that the Mach numbers and flow angles are the same for every stage. Then, approximately:

$$\text{cross-sectional flow area} \propto \sqrt{\text{temperature}/\text{pressure}}$$

But also, approximately:

$$\text{temperature} \propto (\text{pressure})^{1/3}$$

and therefore:

$$\text{area} \propto 1/(\text{pressure})^{5/6}$$

Now the blade height depends on both the area and the hub/tip ratio. Assuming that the latter cannot be made smaller than 0.5 at the entry, Table I can be calculated, showing how the hub/tip ratio increases with pressure through a compressor. Three different shapes have been considered: *I*=inner radius constant, e.g., Olympus; *M*=mean radius constant, e.g., Avon; *O*=outer radius constant, e.g., Sapphire.

TABLE I

Pressure Ratio	Hub/tip Ratio		
	I	M	O
1	0.50	0.50	0.50
2	0.61	0.68	0.76
3	0.67	0.76	0.83
4	0.72	0.81	0.87
5	0.75	0.83	0.89
6	0.77	0.85	0.91
7	0.79	0.87	0.92
8	0.81	0.88	0.93

THE author of this contribution to two controversies—axial versus centrifugal compressors, and turboprops versus turbojets—is a member of the Division of Engineering at Brown University, Providence, R.I., U.S.A.

For the gas-turbine cycle to have a high thermal efficiency, its pressure ratio must be at least six, and it can be seen that this implies a hub/tip ratio of at least 0.77 at the exit. But this, combined with a minimum blade height of at least 1.5 in, gives a minimum outlet area of 54 sq in; and hence a minimum inlet area of 240 sq in, for a pressure ratio of six.

The third advantage of the axial-type engine is a high mass-flow per unit frontal area. But this is only realized if the air velocities through the compressor are increased right up to the point (in the region of 0.85 Mach) where the efficiency begins to drop. This also, of course, keeps the power/weight ratio as high as possible. The upper limit of the velocity corresponds approximately to a mass-flow per unit entry cross-sectional flow area of 1/4 lb/sec-sq in at the entry. So, for an inlet area of at least 240 sq in, the mass-flow of an axial compressor must be at least 60 lb/sec if there is to be no penalty in weight and frontal area.

Table II shows the engine powers corresponding to these minimum figures for pressure ratio and mass-flow.

TABLE II

Top temperature (deg K)	1,000	1,100	1,200
Jet engine, sea-level static thrust (lb)	3,500	3,900	4,300
Turboprop, sea-level static shaft h.p.	4,800	6,200	7,600

Clearly, it pays to use an axial compressor for *all* jet engines (except miniatures). But the minimum power required for an axial turboprop is very large by present-day standards, and for turboprops of smaller power some of the advantages of the axial compressor have to be lost. Either: (1) Some of the blades are shorter than 1.5 inches, and the efficiency drops; (2) The pressure ratio is less than six, giving low thermal efficiency; (3) The velocities are lower than the maximum possible, leading to increased frontal area and weight; (4) The engine top temperature is lower than present materials allow, which also leads to greater size.

The arguments given here do not necessarily mean that turboprops should have centrifugal compressors. There may possibly be a range of power (say, 2,000-4,500 h.p.) where neither axials nor centrifugals are quite suitable, or sufficiently attractive to compete with high-pressure-ratio axial jet or by-pass engines.

It is perhaps worth mentioning that there is reduction of efficiency at altitude, due to the low Reynolds number. The reduction is admittedly more for small engines, but much unnecessary fuss has, in the writer's opinion, been made about what is essentially a second-order effect.

THE Royal Navy, which has to maintain sea communications, regards counter-measures to the submarine threat as of first importance. Much of the new anti-submarine equipment is specialised, and demands unique capabilities and characteristics from the aircraft employed. To cover this feature of defence the Fairey Gannet is in super-priority production, and has also been ordered for the Royal Australian Navy.

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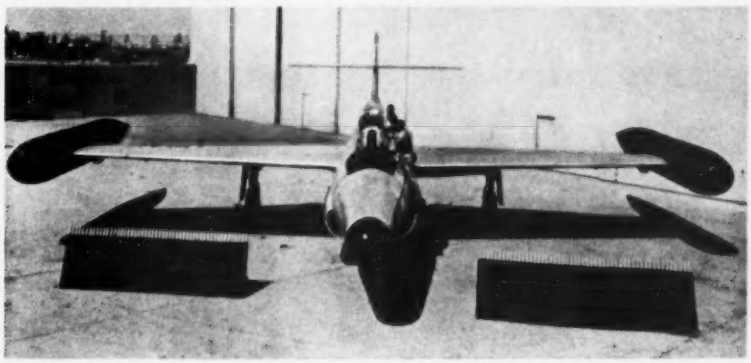
(Four ROLLS-ROYCE Avon jet engines)

AIRCRAFT INTELLIGENCE



SCORPION STINGS: After essential structural revision the U.S.A.F. Air Defence Command's Northrop Scorpions are back in service. This F-89D has been parked behind 104 dummy 2.75in folding-fin rockets; they represent the "Mighty Mouse" weapons which are carried in the wing-tip pods, replacing the six 20 mm nose guns of earlier F-89s.

Great Britain

Fairey Gannet. According to *Aviation Week*, production Gannets fully equipped with electronic gear cost some $224,000 (£80,000).

Canada

de Havilland Canada Light Transport. A $257,774 contract has been awarded by the Canadian Government to the de Havilland Aircraft of Canada, Ltd., for the design and development of a new light transport aircraft. The same company has also secured a development contract for a combined wheel/ski undercarriage.

U.S.A.

New B-47 Stratojets. Among new variants of this Boeing six-jet aircraft—production of which exceeds 500—are: RB-47B, a convertible bomber/photographic aircraft; RB-47E, a high-altitude photographic machine; and ETB-47B, a crew trainer. The RB-47B can be converted from a bomber by removing the bomb doors and attaching a very large camera pod, which fills the weapons bay and so needs no doors to cover it. The pod, which takes eight cameras, is connected to electric and hot-air lines. The RB-47B is turned out by Grand Central Aircraft at Tucson, Ariz.; Aeronca make the camera pod. The RB-47E features a much longer nose than the bombers (*Flight*, August 14th, p. 186) carrying many cameras in an air-conditioned bay. The belly houses intervalometers, optical viewfinder and photocell-operated shutters. This type is built by Boeing, Wichita. The ETB-47B for the Strategic Air Command is a dual-control trainer with many internal alterations. Reduced all-up weight seems to have permitted removal of the RATO bottles, and the radar-controlled tail barbette (two 0.50in guns) is also not fitted.

Turboprop Transports for U.S.A.F. In addition to two Boeing C-97 Stratocruiser-type military transports, to be powered by four Pratt and Whitney T34 turboprops, the U.S.A.F. has on order two Lockheed Super-Constellations, similarly powered, one Convair 340, to be fitted with two Allison T38s, one Douglas YC-124B Globemaster with T34s (due for completion in October), a C-124X with either T34s or a turboprop version of the J65 licence-built Sapphire, and the Lockheed C-130A, with Allison T56s. Both the C-124X and C-130A are high-wing designs.

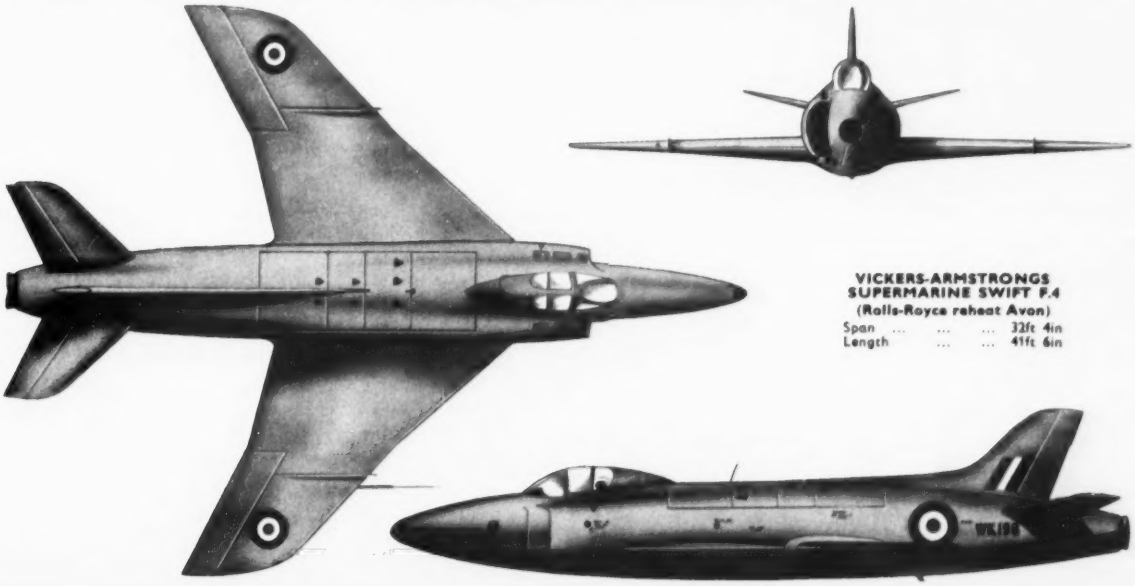
U.S. Navy Notes. It seems that many American observers believe that the Rolls-Royce Avon RA.14 is one of the key engines involved in the R-R/Westinghouse licensing agreement. As such—and the supposition is logical—it will obviously take the place of the ill-starred Westinghouse J40, which is now known to have been abandoned. On this basis it seems probable that the RA.14 will eventually power the Douglas F4D Skyray, and possibly the Douglas A3D attack bomber. Another type scheduled to take the J40 was the Grumman XF10F Jaguar, but this variable-sweep naval fighter is proving too full of ideas for success at the moment. The Jaguar prototype has been complete for about a year, but production appears unlikely. It may also be reported that trouble with the tail-actuators of the F9F Cougar is holding up production, while the Allison T40 double turboprop of the Douglas A2D Skyshark is proving so difficult that the entire programme for this Wyvern-class machine has been cut out. In its place is another batch of Skyraiders, the basic design of which went into production at the end of the war. Finally, the McDonnell F3H Demon (another J40 user) order is being cut back by 91 aircraft; production deliveries are just beginning.

France

Miscellaneous. — The 71 Dassault Ouragans ordered by the Indian Air Force are now in full production; the price is quoted in America as $130,000 each. The first four were due to be ferried out by I.A.F. pilots this week. Down at Istres the flight-testing of the S.E.5000 Baroudeur has so far given little trouble. Some dozen flights have been made, several of more than 40 minutes duration. The second Baroudeur should fly in about eight weeks' time. Arsenal are very proud of their repeat sale of 5.501 radio-controlled targets to the Royal Navy; this machine is immediately descended from the V-1 (Fi 103) flying bomb. New equipment for the Aéro Navale includes S.N.C.A.S.E. Sea Venoms, (this page, February 13th last), of which four or five will have been built by the time this appears in print, and a number of Piasecki HUP-1 helicopters, the first two of which are on their way in the French carrier *Dixmude*. The Piaseckis are being supplied under M.D.A.P.

Argentina

Jet Transport. The former Focke-Wulf director, Kurt Tank, now working in Argentina, has designed a turbojet airliner to seat 40 passengers. Named as the I.A.M.E. 36 Condor 2 by some sources, the project will have four Rolls-Royce Avons mounted in a "quite revolutionary" manner and claimed to give 15 per cent power increase.

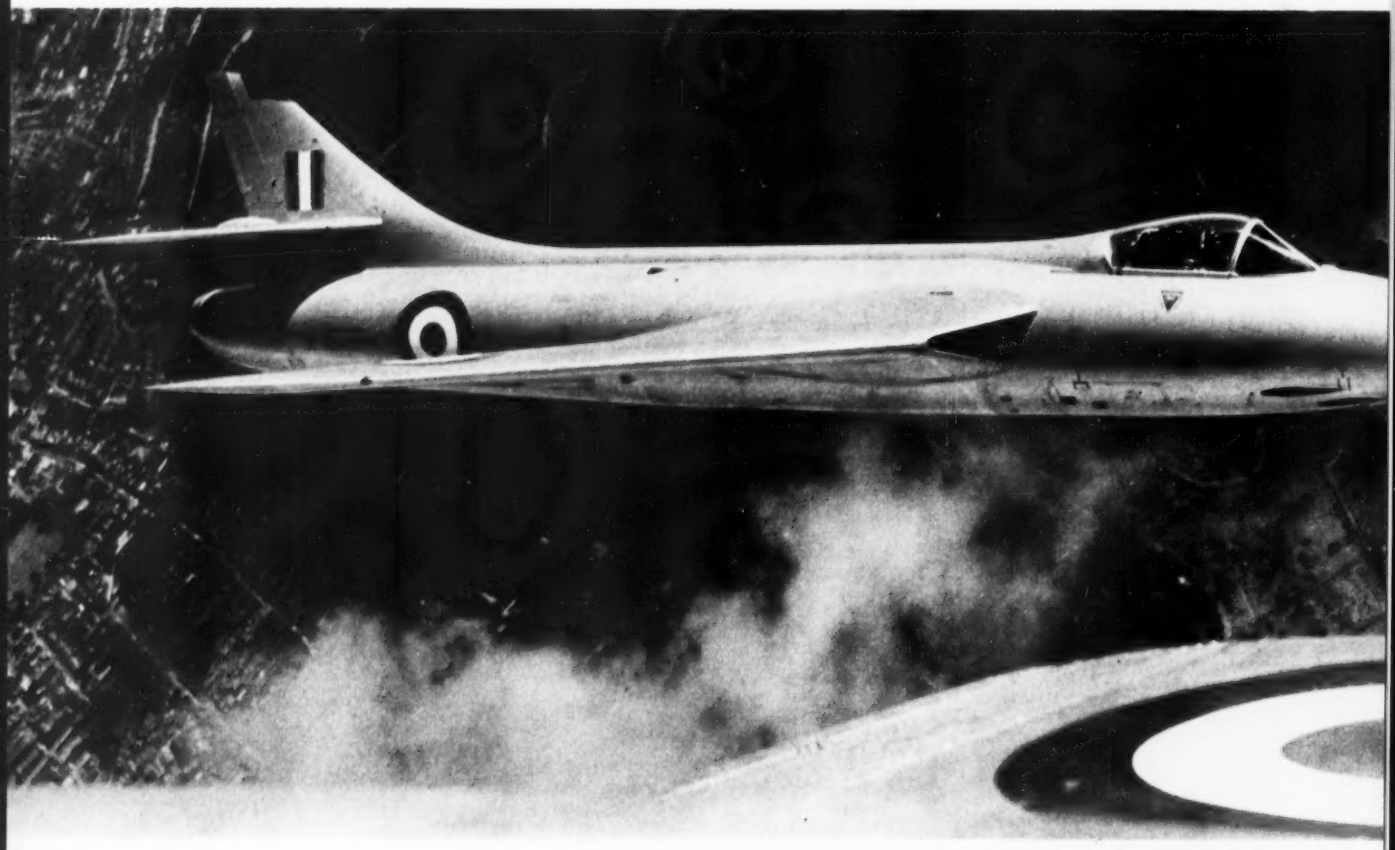


VICKERS-ARMSTRONGS SUPERMARINE SWIFT F.4
(Rolls-Royce reheat Avon)

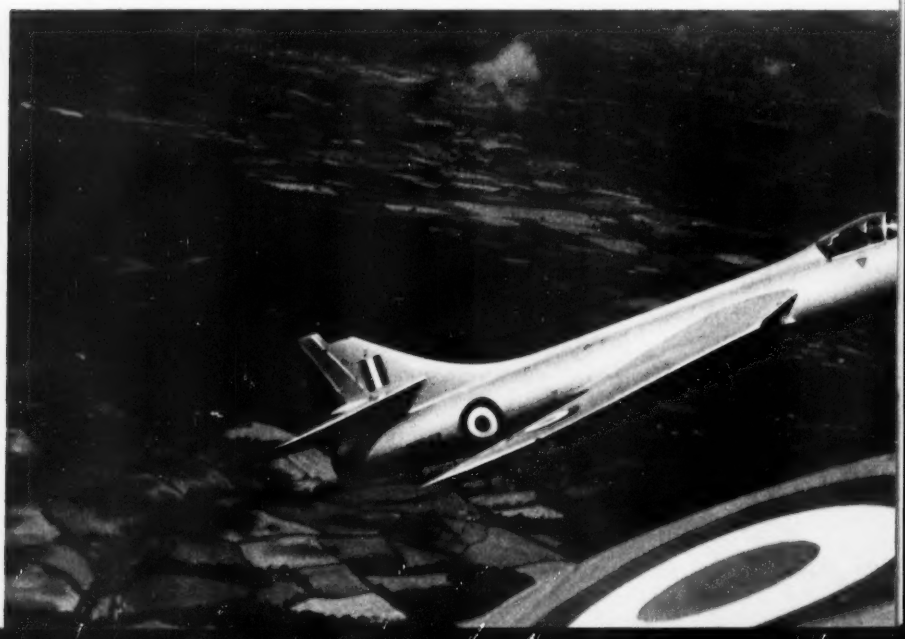
Span	...	...	32ft 4in
Length	...	...	41ft 6in

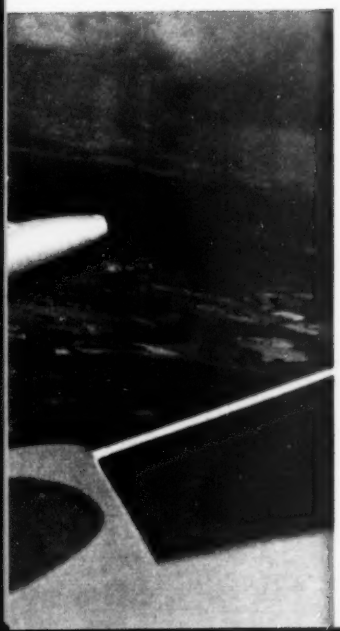
"With Deafening Clamour in the Slippery Clouds"

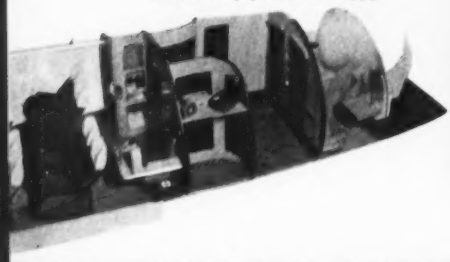
—Shakespeare; King Henry IV

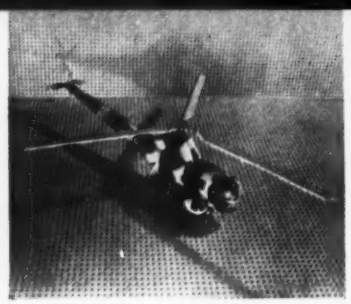


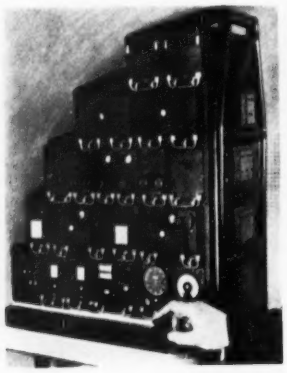
THE Hawker Siddeley Group combined its resources to produce the magnificent views on this page, emphasizing the slim outline of the Hawker Hunter as it manœuvres in formation with a Meteor 7. The photographs, taken by Cyril Peckham, show (above) the Hunter holding the Meteor in a near-vertically banked turn, and (below and opposite) three stages of a formation loop. The considerable vertical distance covered in this manœuvre is shown by the position of the cloud layer. The aircraft, a Hunter F.1 production machine, was on this occasion flown by S/L. Neville Duke, with Jim Cooksey of Glosters at the controls of the Meteor 7 photographic machine.

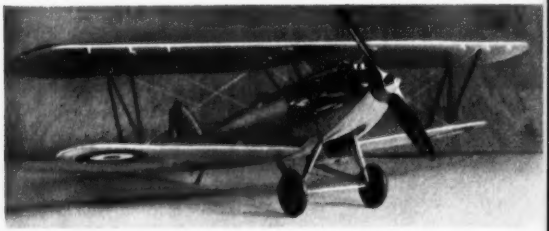






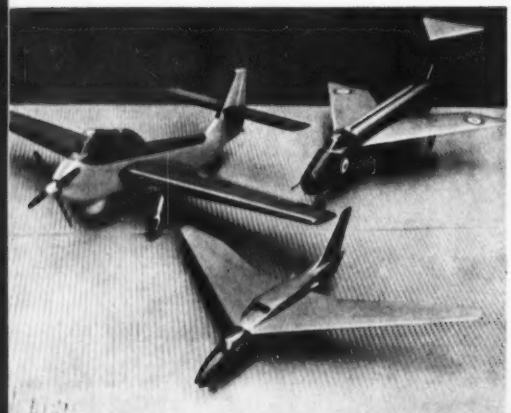






Where Craftsmen and Artists Combine to Reproduce—

THE INDUSTRY IN MINIATURE



VISITORS to the Farnborough Exhibition, and other such shows, must sometimes wonder how and where the superbly finished aircraft models on the stands originate. In most cases they are the work of two or three specialist firms, and in one such factory the photographs on this page were taken. For the solid models wood is the basic material; for the "cutaways"—particularly in demand by airline operators—a moulded Perspex fuselage shell (observable in one of our pictures) is used; the floor and interior fittings are inserted *via* a detached nose, then the shell is spray-painted, masking tape being used to preserve the transparency at windows and cutaway sections. Presentation and other miniatures (as seen below) are of bronze, with a silver-plated or coloured finish The models shown here speak for themselves, but a word or two may be added: the Hart, for instance, is destined for a museum in Australia; and the Hawker design-office drawing from which it was made was signed (over 20 years ago) "Approved by S. Camm." The model of the Marconi radio installation for Comets is exactly half-scale; the panels are of wood, the details metal. The 1/16th-scale Comet interior, for window display, even includes overnight bags and a library of "Penguins."

All these photographs were taken in the works of Westway Models, Ltd., of East Acton, London, the offshoot of a firm which started business during the war by making three-quarters of a million recognition models. All the craftsmen—average age, 25—are aeromodelling enthusiasts; their works manager, Lawrie Barr, won the Queen's Cup at the Northern Heights M.F.C. gala day last July. Managing director is Ian Walker, an ex-air-gunner of No. 100 Squadron.

When thinking of the Lightest . .

The designers of high-speed jet aircraft will place foremost the new MARTIN-BAKER Light-weight Fully Automatic Ejection Seat. With an installed weight of only 50 lbs. this seat is in a class of its own—the lightest in the World.

MARTIN-BAKER

AIRCRAFT COMPANY LIMITED · HIGHER DENHAM NEAR UXBRIDGE · MIDDLESEX

grateful thanks from my wife and myself to you and your colleagues who assisted in getting my daughter and son-in-home f ika, which by now you will have learnt t safe heir journey at Blackbushe yesterday aft noo re you we are most grateful to you all Fro ed by my daughter and her husband there no d that this service of yours is to say the least ful. They both speak most highly of the c on extended to them by all on board ar en route. What is more, I feel perh might like to know t t nature from journey, these coming from folk w used your service before.

When my daughter went out last yea and

PASSENGERS

organisation other than yo trave out on an feel that hey are perh in quite a good sition

AIR THEIR

to judge. Th re only remain now for you to le indebtedness to and I when

OPINIONS

I wi ue by return

my husband and I would like to bring to your notice the quite exceptional efficiency of the air hostess on the Viking in which we flew to Wadi Seidna last Friday October 19th.

I feel that if thi your usual standard you to be congratulated at having arrived at a very high standard indeed. It would be a real pleasure to be able to look forward to the same crew

having just completed a return journey to Nairobi in your line, I would like to place on record my appreciation for the excellent arrangements made for passengers at halting places on the way

I was most favourably impressed with all the arrange ments that were made, with the service of your personnel and with the efficiency attending the flights, and I should like you to know that these special

I arrived at BLACKBUSHE in your flight from Karachi, Pakistan yesterday and would like to let you know how efficient I thought the service was. Everything over which the crew had control

AIRWORK LIMITED

The above are extracts from original letters which can be seen on request at 15 Chesterfield Street, London, W.1.

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AIR TRANSPORT DIVISION

DEBUT WITH A BANG

The R.A.A.F. Avon-Sabre's Inaugural Demonstration

FROM Australia comes a colourful account of the first official flight of the Australian-built Avon-Sabre, when watched by the Prime Minister, Mr. R. G. Menzies, and many senior officials, F/L. "Bill" Scott produced a triple supersonic bang during a dive from 42,000ft. Scott —28 years of age, and weighing 14 stone—is a test pilot on loan from the Royal Australian Air Force to the Commonwealth Aircraft Corporation. The demonstration was given from the new Avalon test field, 33 miles from Melbourne, on August 21st.

Mr. Menzies was clearly very impressed by the flight. In a subsequent speech he said: "In the opinion of those best qualified to judge, this Sabre has a higher performance than any Sabre seen in action in Korea. At this moment it is probably the world's finest fighter."

Later, the Chief of the Australian Air Staff, Air Marshal Sir Donald Hardman, stated that the first squadron of Avon-Sabres would be delivered to the R.A.A.F. within a year. In place of machine-guns, the aircraft would have two heavy-calibre cannons [30 mm.—Ed.]. There would be provision for 16 rockets under the wings, and it would carry two 500 lb bombs.

After the demonstration, Scott said: "I went supersonic at 660 miles an hour, then kept her going faster to hold her to it down to 26,000ft. . . I went up a bit over 700 m.p.h. in the dive without pushing her."

When the Sabre was gaining height preparatory to the dive, the crowd below, and thousands of radio listeners, heard an unscheduled exchange between the pilot and a radio commentator. On take-off Scott made a circuit of the field, then pulled up the nose of the aircraft and shot almost vertically out of sight in a few seconds. The crowd and radio listeners heard his voice reading-off the altitudes as he climbed: "Just passing 27,000 feet . . . 32,000 . . . 35,000."

In the air the Commonwealth Sabre looks much like a standard F-86E, with "all-flying tail" and wing slats. All the early test-flying has been done by F/L. Bill Scott (left).

COMMENTATOR: "We've lost sight of him, Scott's voice is changing as he flies higher."

SCOTT: "I've got my radio compass tuned into 3GL. I can hear that announcer saying what I'm doing."

COMMENTATOR: "You're making me nervous. If I say anything wrong you can pick me up. I've lost sight of him again. I think he's somewhere over towards Melbourne."

SCOTT: "No—I'm just five miles north of you."

COMMENTATOR: "I *knew* that would happen. You'd better waggle your wings, we can't see you. Now you're directly into the sun and I'm almost breaking my neck trying to see you."

SCOTT: "Well, I'll move her over a bit."

Soon the pilot called "42,000 feet" and a few seconds later said, "I'm on the way down. . . Mach point-nine . . . point nine-five . . . point nine-eight. . . There's Mach one. Got it! Holding Mach one."

The three detonations reached the ground about 15 seconds later. Said Scott: "I didn't hear anything. Did you?"

After his dive, Scott took the Sabre through a dazzling 30-minute display of aerobatics. As he climbed from the cockpit, looking like a science-fiction pilot in his green g-suit and red helmet, he was congratulated by the Prime Minister and by the Minister for Defence Production, Mr. Eric Harrison.

Earlier, the Prime Minister had said that the job of installing the British Avon engine in the American Sabre fuselage had demanded a tremendous amount of engineering skill, and he warmly acknowledged the co-operation of Rolls-Royce and North American Aviation. The Commonwealth Aircraft Corporation, which was building the Avon-Sabre for the R.A.A.F. at its plant in Melbourne, had to make extensive modifications to the original Sabre airframe to take the more powerful Avon. (It is said that substitution of the more powerful but no heavier Avon for the General Electric J47 has necessitated major redesign of 60 per cent of the fuselage structure. Mr. Ian H. Ring, Commonwealth's chief engineer, disclosed that one of the most important modifications was the 25 per cent enlargement of the nose intake, in a vertical direction, to accommodate the higher-placed intake of the Avon.)

The Minister for Defence Production hit at local critics of the policy of building military aircraft in Australia instead of

Close up, the numerous stencils can be read: several refer to the large access-door for the starboard 30 mm gun, whose blast tube is prominent. The enlarged Avon intake is also noticeable.

DEBUT WITH A BANG . . .

buying them abroad. "Australia has never been in a position to buy aircraft, in times of emergency, capable of mixing it on equal terms with the best any possible enemy can bring forward," he said. "So long as we are completely dependent on British or American manufacture for front-line aircraft, our orders will only be met when the needs of those producing countries have been met. That is logical and inevitable. But it is too late. We must be in a position to arm ourselves in emergency, and that involves an adequate peacetime aircraft industry."

Congratulations were showered on the Australian aircraft designer and builder W/C. L. J. Wackett, director and manager of Commonwealth Aircraft, who was largely responsible for the conversion.

The first official flight of the Avon-Sabre followed the debut of another English designed, Australian-built aircraft only a few weeks earlier—the Canberra, now in production for the R.A.A.F. at the Government Aircraft Factories. Both are powered with Avons built by Commonwealth Aircraft under licence from Rolls-Royce. To get the first of these new aircraft into the air as quickly as possible, a number of engines were brought from Britain, but manufacture is now in full swing in Melbourne.

Under the terms of the agreement with North American Aviation, that company supplied all necessary engineering data, drawings, specifications and production information for the Sabre. Australia was also able to buy components and specialized tools from the company.

EAST ANGLIAN ROTOR SPRAY

In the Field—and above—with Crop-spraying Hillers : A Typical Day

FLIGHT duration, less than ten minutes; turn-round time, one minute. Such are typical figures for the helicopter operations of Pest Control, Ltd., in the crop-spraying and dusting season. Before the 1953 season came to a close, much useful work in the continual fight against agricultural pests was being performed daily by the company's four Hiller 360s—and also by their six Austers, five of which have been operating abroad. To spend a typical day in the field with one of the rotorplanes and its crew, at work in East Anglia, was our recent pleasure.

Although the company's main base is at Bourn, Cambridge, it is from the five area headquarters that much of the actual flying operations are directed. For our visit, we travelled to Downham Market, headquarters for Pest Control's Eastern area, comprising East Anglia and South Lincolnshire.

After a morning's work on land quite near to Downham Market, the afternoon's task was farther afield. It involved a journey to Stalham, Norfolk, some 50 miles distant by helicopter, and finally to a farm near Cantley, Norfolk. On such a job, the refuelling vehicle (which carries supplies of spraying chemical, water and oil, as well as petrol) sets out ahead of the spraying aircraft, and drives to the pre-arranged landing site. This is normally a field very close to the area to be sprayed. With the tanker go one or two tanker attendants and a helicopter fitter, the remainder of the spraying team comprising the pilot, two crop-markers, and the company's local supervisor.

Arriving at Stalham from Downham Market, we saw how little time was wasted before the Hiller was in action. Having flown over with full spraying tanks, the machine required only the belt drive to the delivery pump to be connected and the action of the spray-bar checked before being immediately ready to begin work. Only other pre-flight formality was for the pilot, Lincoln Lord, to study a large-scale map of the area, in consultation with the supervisor, Mr. C. Hammond and the farmer, Mr. W. J. Kendall, and to note the fields to be treated.

Each site has its own problems; at Stalham, the main field to be sprayed (a potato crop being treated against potato blight) was enclosed by trees on all four sides, and a line of electric cables ran along one end. For a fixed-wing aircraft, the obstacles would have made the job impossible, and indeed it was no easy task even for the helicopter, which for safe and rapid spraying does prefer unobstructed approaches and exits to and from the crop.

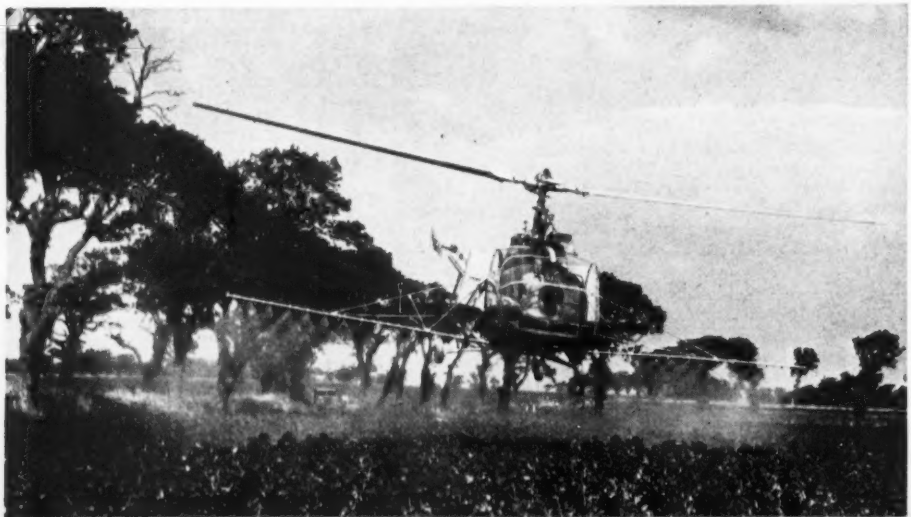
From its parking place near the tanker the Hiller lunged forward and upward to begin its spraying task, the only ground facilities required being a casually flapping handkerchief held by the ground engineer to indicate wind direction. From the landing site the insect-like machine could be seen only between the actual spraying runs, some quarter-mile away, as it rose at the end of the field and, after a brief downwind leg, turned again, descending to commence yet another pass over the potato crop. Several times it repeated this, spinning up and around from the masking trees—and incidentally attracting many local spectators to view this novel shape in the Norfolk sky.

At the field itself, the skill required of the Hiller pilots was strikingly evident. Flying a steady run with only two feet clearance, the machine seemed to approach uncomfortably close (to one thinking still in terms of fixed-wing flying) to the trees ahead, before rearing up and around—or, in one case, continuing straight on through the rotor-span space between two particular trees.

Swath-width was indicated by a human marker, immersed waist-high in the potato plants. As soon as the Hiller was lined

A pre-flight discussion on the crops to be tackled. (Left to right) Lincoln Lord (pilot), C. Hammond (area supervisor) and W. J. Kendall (farmer).

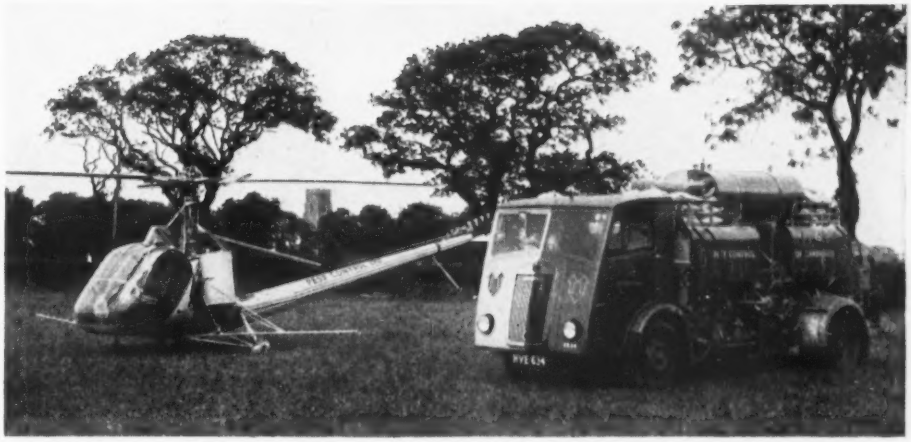
"Flight" photographs



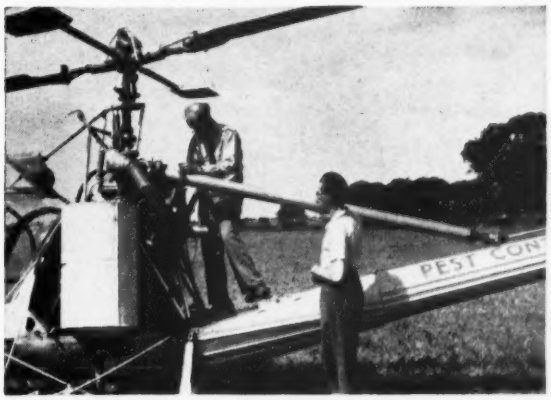
A striking action picture as the Hiller turns and rises at the end of the field. Four such machines are operated by Pest Control, Ltd., of Cambridge.

Basic rotorstation: a field near Stalham. Ground equipment required, one combined tanker. The result—simplicity in operation.

"Flight" photographs



After arrival at the site, the pilot connects the belt drive from the Franklin engine to the delivery pump before spraying is commenced.



up and had started the run, a smart move on the part of the marker was desirable, in order to avoid the bright green mist of "Blitox" copper fungicide, streaming from the outstretched arms of the rotorplane's spray-bar.

The work continued briskly. With but two refills of chemical (each performed in less than one minute, with the engine still running) the 35-acre field was soon completely sprayed, including the final "trim" along the edges. This was the second application of the fungicide to this crop this season, both applications being preventive measures against potato blight.

From Stalham to Cantley was our next move—performed at Mr. Lord's invitation in the left-hand seat of the Hiller. A second tanker had already driven ahead to the new site, where we were to rendezvous. Another glance by the pilot at the location of the new site on the map—and by the writer at the doorless space on his left—preceded a swift take-off, and the start of our cross-country by helicopter.

The manœuvrability of the helicopter compared with fixed-wing aircraft is no new fact (in that it has been effectively stressed in print and demonstrated in action) to fixed-wing pilots and others. Yet the fact remains that only when flying by helicopter is personally experienced do the full implications of rotary-wing flight became apparent. Cruising at 200ft and about 60 kt—one gets used to the air speed quite soon—we experienced that feeling of air-ground intimacy shared by users of helicopters, gliders and free balloons. Admittedly, the helicopter has engine noise, and yet the droning of the Franklin unit was insufficient to drown the voice of the pilot as he remarked on the countryside below.

Reactions from the occupants of the countryside below to our flight were varied. Invariable, however, was the bustling panic caused in every chicken-run over which we passed—a contrast to the studied indifference of most other animals, with the exception of a thoughtful-looking brown cow, which cast aloft one slow, reproachful glance. From the waterways of the Norfolk Broads came the vigorous waving of affable sun-worshippers, before we crossed agricultural land again, and descended towards the bright, two-tone tanker, parked this time on a now-barren pea field.

The ground engineer's handkerchief and hand signals guided us in (the first sensation of hovering almost on top of one's "taxi instructions" was most disconcerting), and the Hiller eased itself comfortably onto the ground. At Cantley, the crops to be tackled that day were again potato plants, again to be sprayed against blight. In Norfolk, in addition to much work of this type, a large acreage of marshland is annually treated by the Pest Control Hillers. Weeds have to be destroyed and the marsh grass itself fertilized: a difficult job by ground-spraying methods.

During the day of our visit some 180 acres had been sprayed by this particular Hiller, a good total in spite of the large amount of travelling necessary between farms. The flying was shared by two of the firm's pilots; Mr. G. A. Macpherson, who had flown that morning, took over from Lincoln Lord again for the evening spraying. On a good day, between 300 and 400 acres can be treated by one helicopter.

The weather this year has considerably hampered the company's airborne activities. Flights at dawn and sunset have often been required to avoid excessive winds and rain. From our brief visit to the spraying team in the field, however, it is obvious that in this country the helicopter is a necessary—and, indeed, an established—unit in the effective control of agricultural pests. In a great number of cases its use is preferable to that of ground vehicles or fixed-wing aircraft for spraying and dusting purposes; in many, it is essential. The Hiller 360 has been found to be an economical and most useful tool by Pest Control, Ltd., but it is to the company's skilled pilots—backed by an efficient ground organization—that most of the credit for the helicopters' effective use must go. On the amount of helicopter spraying now being performed, it appears that the British farmer recognizes the worth of this valuable combination of men and machines.

K. T. O.

THE COMMONWEALTH RESEARCH CONFERENCE

A GUARDED official statement issued by the Ministry of Supply after the conclusion of the third meeting of the Commonwealth Advisory Aeronautical Research Council, which opened in London on August 31st, said that among the subjects discussed were "the new problems arising from high-speed flight and the possibility of providing a Commonwealth pool of aircraft for flight research; the impact of new materials which is governing advances in many fields; future aerodynamic efficiency of the seaplane; engineering problems of conditioning aircraft for human occupation and control; scientific problems of aircraft noise; and the importance of Commonwealth co-operation in the study of air gusts at high altitudes."

Sir John Cockcroft, Chairman of the Defence Research Policy Committee of the Ministry of Defence, who opened the discussions, stressed the value of Commonwealth conferences of this type and of visits by scientists from one country to another.

The meeting, under the chairmanship of Professor A. G. Pugsley, chairman of the Aeronautical Research Council, was attended by delegates from Australia, Canada, India, New Zealand and the United Kingdom.

The Council was set up in 1946 to review the progress of aeronautical research within the Commonwealth in order to advise on the broad planning of programmes and on the facilities required. Its next meeting is likely to take place in 1955.

THE INDUSTRY

D.H. Propellers Appointment

ON October 1st, Mr. F. W. Long, C.B., joined de Havilland Propellers, Ltd. His duties will consist in liaison with users of the company's products at home and abroad.

Mr. Long, who recently retired from the Royal Air Force with the rank of air vice-marshal, has had a long and distinguished Service career. He served in squadrons overseas in the early twenties and was for four years a Farnborough engine-test pilot, in which capacity he had much to do with the flight development of exhaust-driven and gear-driven superchargers and metal airscrews. In 1928, flying a D.H.9R fitted with a turbo-supercharged Napier Lion, he attained a height of nearly 34,000 ft, an unofficial British record at the time. From Farnborough he went to Felixstowe as a member of the High-Speed Flight. His last appointment was as A.O.C. 23 Gp., Flying Training Command.

Originality in Apprentice Awards

AN original and appropriate form of award for apprentices whose work shows outstanding merit has been adopted by Kelvin and Hughes, Ltd., the well-known instrument manufacturers: The company's training panel now nominates successful candidates among craft and technical apprentices for a month's course at the "Outward Bound" Sea School at Aberdovey.

The first four winners are now at the school; they are D. H. Black and J. D. Martin, of the company's Barkingside factory, and D. J. Benham and A. J. Damoisiaux, from the Basingstoke Works.

Bolt-and-nut Standards

THE British Standards Institution has published a series of Standards for a range of bolts and nuts, of ¼in nominal size upwards, with UNF threads and with hexagon dimensions agreed for aircraft use between representatives of the American, British and Canadian Services and industries.

This series of hexagon sizes differs from that of the "normal" series of Unified precision hexagon screws and nuts for general engineering purposes (covered by B.S. 1768:1951) in providing common dimensions for the hexagons of bolts and nuts of the same nominal size, and in the dimensions of hexagons for ¼in, ⅞in and 1in nominal-size bolts and nuts.

Numbers, titles and prices of the specifications are:—

A.102, steel bolts (Unified hexagons and UNF threads) for aircraft, 4s; A.103, steel nuts (Unified hexagons and UNF threads) (ordinary, thin, slotted and castle) for aircraft, 3s; A.104, corrosion-resisting steel bolts (Unified hexagons and UNF threads) for aircraft, 3s 6d; A.105, corrosion-resisting steel nuts (Unified hexagons and UNF threads) (ordinary, thin, slotted, and castle) for aircraft, 3s; A.106, aluminium-alloy bolts (Unified hexagons and UNF threads) for aircraft, 3s 6d; A.107, aluminium-alloy nuts (Unified hexagons and UNF threads) (ordinary and slotted) for aircraft, 2s 6d; A.108, steel bolts (Unified hexagons, UNF threads and close-tolerance shanks) for aircraft, 3s.

Copies of these standards may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1, at the prices given above.

TIME-SAVER: Lunch at home in Bedford, a two-hour conference in Huddersfield, and home for tea, was the recent programme of Mr. N. Rodgers and Mr. M. Rodgers, of W. H. and J. Rodgers (Engineers), Ltd. They flew in an Auster J.5G Autocar some 120 miles from their own airstrip at Bedford to that of David Brown Tractors at Meltham, Yorks. They are here seen with (second from left) Mr. T. A. Lazenby and (extreme right) Mr. K. C. Wilson of David Brown.

Trailers to Order

THE design, supply and hire of mobile trailer units to serve a wide variety of purposes is the objective of a company recently formed. Various vehicles are available, designed for use as travelling showrooms, dispensaries, X-ray units, laboratories, tropical living quarters, and so forth. The hire fleet includes units arranged for publicity and entertainment purposes at air, engineering and agricultural shows.

The new company, Pilgrim Motor Units, Ltd., has its head office and works at Ringwood, Hants (Ringwood 381) and a London office at 176 Piccadilly, W.1 (Hyde Park 0479). The chairman is Maj. J. V. Phipps, M.A., who is also chairman of Pilgrim Caravans, Ltd., and the managing director is Mr. D. R. Hobson, O.B.E., formerly a senior executive of Anglo-Iranian.

IN BRIEF

THE firm of Petbow, Ltd., of Sandwich, Kent, state that one of their ground power units has been in use for starting the Olympus-Vulcan at Woodford. The unit was taken to Farnborough Show to perform similar services for the big delta when it was demonstrated in the flying display.

* * *

To assist designers to select the most suitable Magnuminium alloys for particular requirements, a new booklet of data-sheets entitled *Magnuminium Technical Data* has been issued by High Duty Alloys, Ltd., Slough, Bucks.

* * *

Very detailed design-data for the most effective choice of Pioneer O-ring seals for numerous different applications is contained in a new handbook published by the Pioneer Oilsealing and Moulding Co., Ltd., Colne, Lancs.

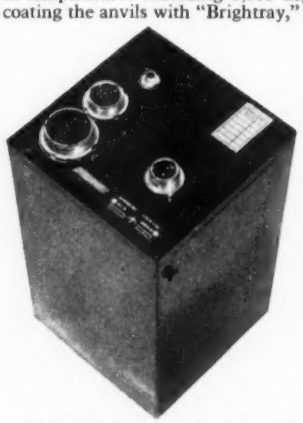
* * *

From Startrite Engineering Co., Ltd., Waterside Works, Gads Hill, Gillingham, Kent, comes a description of their new woodworking saw-bench. Driven by a 1½ h.p. electric motor, the machine has an 11in diameter saw and a 3ft x 3ft worktable with feed and run-off rollers. Maximum cutting capacity is 4¼in.

* * *

Ferrybridge Industries, Ltd. (Whitehouse Industries, Ltd.), announce that they have opened London premises which will carry stocks of the products of their Pollard Bearing Division and Philidas Self-locking Nut Division. Managing the new office—at 6 St. James Place, London, S.W.1 (Hyde Park 9248-9)—will be Mr. W. F. Clay, and Mr. T. S. Nethersole will be in charge of matters concerned with technical sales.

Using the electrical upsetting process for the pre-forming of drop-forgings for compressor blades, the Bristol Engine Division came up against the problem of protecting the surfaces of the upsetting anvils, which have to withstand extremely high loadings at temperatures exceeding 1,000 deg C. It was solved by weld-coating the anvils with "Brightray," the well known 80/20 nickel-chromium alloy. Bristols, incidentally, pioneered the use of "Brightray" for engine valve-protection, before the war.



MESSAGE-CENTRE: The compact radio-control receiver—6in x 6in x 10½in, weighing 10 lb—employed in the M.L. Aviation pilotless target aircraft (described in "Flight" of August 28th). It was designed and manufactured under an M.o.S. contract by BEME Electronic and Marine Equipments, Ltd., of Shipyard Estate, Hythe, Hants.

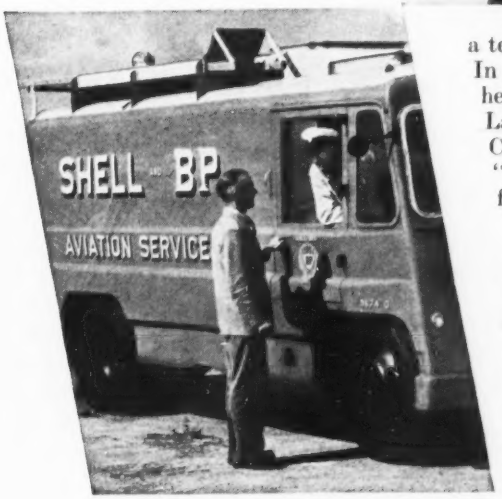
Adcola Products, Ltd., Cranmer Court, Clapham High Street, London, W.4, announce an addition to their range of soldering-tools: it is an instrument designed for extremely fine work, such as the soldering of details in instrument movements, miniature rectifiers and similar assemblies.

The aeroplane

The Avro Shackleton — designed for long range heavy operations over the sea — now standard aircraft for Coastal Command. Under active service conditions it once completed 17 hours each day for 10 consecutive days without failure. Engines : 4 Rolls-Royce Griffon piston. Span : 120′ length 77′.

the pilot

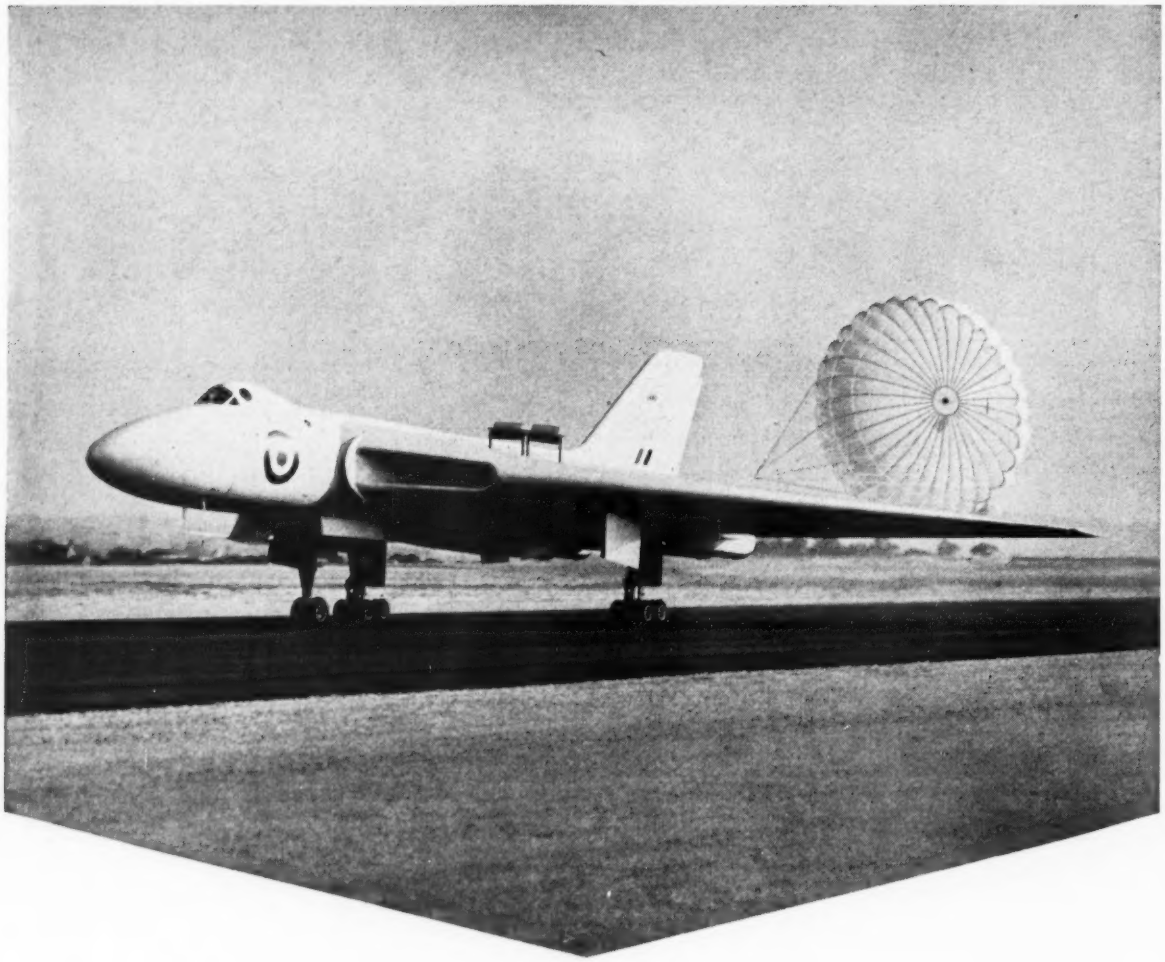
After war service in Bomber Command John Baker became a test pilot for the R.A.F. and later with A. V. Roe. In 1946 he specialised in flying boats but since then he has flown nearly 100 different types of aircraft. Last year he piloted the initial flight of the Avro Canberra. Of Shell and BP Aviation Service he says "For a trip over the Atlantic you don't take anything for granted — and this is the service for me."



Shell and BP Aviation Service

"Over and out" says the control tower — it's a smooth landing — and it's over to Shell and BP. And next trip out the pilot will have the same confidence in the servicing of the craft as he has in the clear tone of the control girl giving permission to take off.

SHELL-MEX AND B.P. LTD., Shell-Mex House, Strand, London, W.C.2.
Distributors in the United Kingdom for the Shell and Anglo-Iranian Oil Groups.



The landing run of the Avro Vulcan is greatly reduced by the Ribbon Brake Parachute designed and manufactured by

IRVIN

THE IRVING AIR CHUTE OF GREAT BRITAIN LTD.
LETCHWORTH, HERTS, ENGLAND

Telephone : Letchworth 888. Telegraphic Address : "IRVIN", Letchworth.

FOR THE RECORD

"THE knee-pad and pencil have for very many years been indispensable to the test pilot; but there is little doubt that, as observations become more and more detailed, and the pilot has to study the behaviour of an ever-increasing number of components, accessories and services, some form of 'automatic notebook' must be the logical successor to the aforementioned two simple tools of his trade."

With these words, in April 1951, we introduced a description of an airborne voice-recorder for test pilots, and we ended with the remark that ". . . the full possibilities of automatic wire recordings have yet to be discovered. The medium is now available, and the next few years will doubtless see it well tried, not merely as an aid for the test pilot alone, but for many jobs, including (with intercom connections) crew-training work."

The particular equipment was developed by Wirek, Ltd. (a subsidiary of Boosey and Hawkes, Ltd.) in conjunction with Hawker Aircraft; now, after two-and-a-half years' further development, these recorders—manufactured by the electronics division of Boosey and Hawkes, at Edgware, Middlesex—are being used for flight-testing by most of the big-name aircraft and engine firms in the British industry. The manufacturers state that there have been four occasions on which an experimental aircraft has been lost with one of their recorders on board. From these incidents the salvaged recorder has been played back to provide important clues to the causes of the mishap. On two of these aircraft, say the firm, the fire which followed the crash more than justified the stainless-steel wire as the recording medium; this material can withstand 550 deg C before the recording fades.

The equipment—now known as the "Airborne" recorder—has been specially designed for its job right from the start; it is not a general-purpose recorder modified for aircraft use. Outstanding features are compact size (12in x 6in x 5½in overall) and low weight—9 lb, or 10 lb including switch, terminal box and connecting cable. The recorder can be housed in any convenient part of the aircraft and operated by remote control. Power is taken from the 24-volt aircraft supply, without the use of invertors or vibrators, and the signal input circuit is so arranged that the instrument can be directly connected to the pilot's microphone or, alternatively, to the output side of the aircraft R/T. equipment.

The mechanism and amplifier are housed in a robust, flameproof metal case which affords maximum protection against both fire and mechanical damage in the event of accident. The mechanism is designed to withstand both extreme g-effects and severe vibration, and anti-vibration mountings may therefore be omitted where limits of space dictate.

In comparison with the simple notebook the one weakness of a recorder lies in the possibility of mechanical failure or human oversight. Accordingly, the designers of the Airborne have taken every possible precaution. For example the amount of wire available for use can be quickly checked before flight by means of a press-button indicator; and the motor-run switch can be operated by the pilot or, alternatively, the motor can be set to run continuously throughout the flight, so that recording will not be dependent upon the pilot remembering to switch on. Additionally, a light indicator in the cockpit flashes at three-second periods, not merely when the motor is running but when the wire is passing correctly through the recording head. The light ceases to flash if any of the following faults should occur: Recorder not switched on properly; power failure to recorder; broken recording wire; jammed wire spool; wire completely used up (after the full 65 minutes available or if a shorter-duration spool has been fitted in error); or faulty six-way connection to recording unit.

The complete "Airborne" recorder installation—recording unit, terminal block and switch. Inclusive weight, with cables, is 10 lb.

"Side tone" is incorporated, so that the pilot hears his own voice when he speaks into the microphone. So long as he hears his speech and the indicator light continues to flash, he is assured that what he says is duly being recorded.

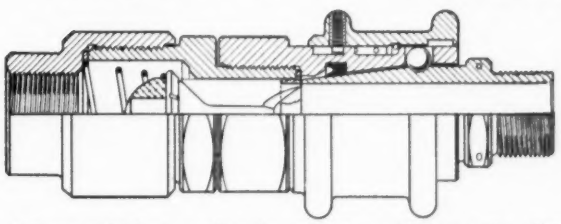
For playback, the Boosey and Hawkes Model A wire recorder is available. This is a heavy-duty, general-purpose instrument as used in the British armed Services and it can be used for general recording and reproducing purposes as well. It offers fast rewind, immediate replay, loudspeaker reproduction and automatic erasure of old recordings to permit the re-use of wire.

HIGH-PRESSURE-AIR COUPLINGS

THE firm of Feeny and Johnson, Ltd., make several products of widely differing character; as examples may be quoted, on the one hand, hose clips and, on the other, vacuum-operated control-conversion units to enable motor vehicles to be handled by disabled drivers.

Experience gained in the design and manufacture of both these products has, no doubt, played a part in the production of another of their specialities, the Feeny and Johnson "C"-type coupling for high-pressure air-hose. This type of connection, which can be quickly coupled and uncoupled without the use of tools, is available in three sizes (¼in, ⅜in and ½in bore) and is designed to remain airtight under extremely high pressures; it is stated, for example, that the ⅜in coupling has been N.P.L.-tested to a pressure of nearly 5,000 lb/sq in. The makers add that the ½in type, which has been supplied for use in connection with air-started aircraft gas turbines, should easily carry 12,000 lb/sq in.

Very briefly, and as will be seen from the accompanying drawing, the quick-connection system consists of two basic members, the engine-fitting of which is tapered to receive the hose fitting; locking is performed by a ball-located sliding sleeve, and the taper carries a rubber sealing-ring.



A Feeney and Johnson coupling shown half-size and in part section. This example has an automatic shut-off valve—visible, with its spring, towards the left—incorporating a controlled leak at the valve-face.

All the couplings can be supplied either with or without an automatic shut-off valve, which may also, if required, provide a small controlled-leak. The weight of the male part of the coupling, as fitted to the engine or other component, is 6½ oz, and this fitting projects 2¼in. The couplings have a rustproof finish and standard threads for attachment to pipeline end-fittings.

Offices and works of Feeny and Johnson, Ltd., are at 134-136 Ealing Road, Wembley, Middlesex.

A. CDRE. WARBURTON'S NEW POST

FROM Auto Diesels, Ltd., Uxbridge, comes news of the appointment to their Board of A. Cdre. James Warburton, who will be mainly concerned with their aircraft equipment division. The company state that they have recently received large orders from B.O.A.C. and other prominent air lines and aircraft manufacturers for their aircraft starting and servicing units.

A. Cdre. Warburton received his early Service training at the Royal Naval Colleges at Osborne and Dartmouth and subsequently at the Royal Air Force College, Cranwell. He has seen considerable service in the Far East, having served in India, China and Japan, and during the course of these tours of duty visited Siam, the Philippines and Australia. He held two appointments as Air Attaché to the Government of China and has a working knowledge of the Chinese language, as well as speaking Japanese. His last appointment before joining the company was as A.O.C. No. 64 Group.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Puffs and Bangs

IT was with considerable shock that I read Mr. Warren's review (September 11th) of the controversy on supersonic bangs. There is a point of view which requires that in any legal action the jury and not the litigants produce the verdict. Would it be impertinent of me to suggest that this principle be adopted here?

The uncompromising attitude that Mr. Warren is correct and all others "wildly" false cannot go unchallenged. The explanation I put forward last year, that the passage through Mach 1 caused the audible bangs, was suggested by the fact that only at this Mach number does the disturbance remain localized, in contrast with purely supersonic conditions when the shock-wave propagates sideways from its source. This seemed to explain why the pilot needs to aim the bang with accuracy and, incidentally, can explain the localized puffs of vapour and of vapour trails which have been observed.

Anyone qualified to judge Mr. Warren's toy-balloon explanation will readily observe a flaw in his argument. (See *Flight*, October 17th, 1952.) The flaw is not immediately obvious in the treatment he gives, but an exact two-dimensional treatment—as opposed to his approximate one—or a three-dimensional discussion shows that it is difficult to explain reinforcements of disturbance at a point due to straight-line flight except at Mach 1.

I therefore challenge Mr. Warren to produce a simple two-dimensional explanation of this reinforcement, using the principle of simple superposition of disturbance for the case of an aircraft travelling along a straight path at any Mach number greater than one.

Kingston-upon-Thames. B. A. HUNN.

IN C. H. E. Warren's useful summing-up (p. 382, September 11th) of the state of knowledge on "bangs" he mentions one unsolved mystery—that of "puffs" in the sky during the high-speed dive.

At Farnborough I heard the commentator call attention to puffs at a time when an aeroplane was diving towards us at about M = 1. It had been making a vapour trail during its climb and level approach, but during its dive the trail became intermittent, and one detached length of trail was described by the commentator as a puff, because he was looking at it almost end-on. I suggest that the puffs are short lengths of vapour trail (contrail) looked at end-on, and that these are not necessarily associated with supersonic flight at all.

The local pressures round an aeroplane differ from that elsewhere at the same height by amounts depending on the position of the point in question relative to the aeroplane and its speed and attitude. If the local pressure falls, the air is cooled; and, if the dewpoint is reached, the water vapour in the air condenses to form cloud, or, if the air is cold enough, ice crystals.

During high-speed pull-outs the pressure in the wing-tip vortices becomes very low and wing-tip trails are often seen even at low altitudes. The water droplets quickly evaporate as the tip vortex-strength is dissipated. If the air is humid enough the low pressures over the wings and round the fuselage produced by a fast level run are enough to cause a temporary cloud to form, and at recent displays fast aeroplanes have been accompanied by a flickering cloud which continuously forms at the front of the aeroplane and evaporates an instant later at the back.

When these effects occur at high altitude they tend to be more permanent. Instead of droplets of water the vapour now turns directly into ice crystals. These act as nuclei to which other molecules of water are attracted, and the trail may remain for a considerable time—sometimes growing to become a long sheet of cloud. At other times the pressure is not low enough, but the extra water vapour from the aeroplane exhaust gases is enough to saturate the air locally.

The type of water-vapour effect depends on the amount of vapour already present in the air. This is far from uniform in the atmosphere and varies especially with height. A diving aeroplane passing through layers having a varying water-vapour content will thus often leave a broken trail—perhaps only a few short lengths. When the dive is towards the observer he will see the sudden appearance of puffs of cloud, which may persist or rapidly evaporate according to the local humidity. Thanks to these vapour trails at Farnborough at this year's S.B.A.C. show we knew when to listen for the bangs.

The bangs from Bedford's Hunter on the Tuesday and Wednesday numbered three from each supersonic dive—six when he exceeded M = 1 twice. The first two (the bow and tail waves from the wing) appeared loudest to me and were about one-fifth of a second apart, while the quieter rear wave, shed at M = 1, followed about one second later. These three accord well with the theories summed up in your issues of June 5th, 1953, and by Mr. Warren on September 11th last.

The 1953 novelty was the six bangs from the Hunter double dive. What is being thought up for 1954? I hope some suitable reward will be given to the first pilot to burst the marquee.

Cranfield. A. H. YATES.

Reaction Propulsion Research

THE method developed by O.N.E.R.A. "for studying the flow of liquids in rocket motors" ("Parisian Round-Up," p. 83, *Flight*, July 17th, 1953) appears not unlike that used, over five years ago, at New York University, for studying the combustion processes of pulsejet engines.

Models, similar to the famous "Dynajet" (produced by the Aeromarine Company, Dayton Municipal Airport, Vandalia, Ohio, as power units for model aircraft, cars, and hydroplanes), with normal metal intake, fuel inlet and valves, had a Pyrex combustion chamber and tail-pipe. From when, a few seconds after starting, the engine was operating "smoothly," until the Pyrex tube, under the combined effects of heat, pressure and resonance generated by the intermittent explosions, finally fractured (the average "life" was betwen 20 and 30 sec), several hundred complete combustion cycles were recorded by a camera taking photographs at 2,000 frames per second.

These films, in addition to providing other data, clearly showed how air is sucked in through the tail-pipe after each explosion, which fact often surprises "the layman."

Cambridge. PEDANTICA.

World Speed Records

LET us bury deep in the ground once and for all two false claims for world speed records frequently claimed for Britain by writers and advertisers. The first claim is for 226.75 m.p.h. by Henri Biard in a Supermarine S.4 (Napier) in 1925. According to the F.A.I. list the record was set at 278.50 in 1924 by Adjutant Bonnet of France in a Bernard.

Then a claim is made for an S.5 (Napier) flown by D'Arcy Grieg in 1928 at 319.57 m.p.h. The latter has more substance than the former, for it beat the 318.64 m.p.h. by di Bernardi in a Macchi for Italy; but as it did not beat the previous figure by the necessary 5 m.p.h. it was not confirmed. Let us also bury that awful F.A.I. word "homologated" and in future say "confirmed."

London, S.W.3. GEOFFREY DORMAN.

[In our Supermarine historical article last week—which, incidentally, Mr. Dorman had not seen when he wrote the above letter—we quoted the S.5's 319.57 m.p.h. as a *British* record. We were, however, in error in repeating the Supermarine claim to a world record with the S.4 in 1925; research suggests that our correspondent's correction is valid.—ED.]

FORTHCOMING EVENTS

Oct.	9.	Airlines Ball, Royal Albert Hall, London.
Oct.	13.	R.Ae.S. Section Lecture: "Use of Materials in the Plastics Range," by H. L. Cox, M.A., F.R.Ae.S.
Oct	20.	R.Ae.S. Graduates' and Students' Section: "An Introduction to Gas Turbines," by D. H. Mallinson.
Oct.	23.	Aerauto Association: Annual Dinner and Dance, Westminster Arms, Page Street, London, S.W.1.
Oct.	23.	R.Ae.S. (Birmingham): "Helicopters."
Oct.	28-30.	Institute of Welding: Annual Dinner and London Autumn Meeting.
Oct.	29.	R.Ae.S. Main Lecture: "A Quantitative Study of Instrument Approach," by J. F. W. Mercer, B.Sc., A.C.G.I.
Oct.	30.	R.Ae.S. Graduates' and Students' Section: Informal Reception and Dance.
Nov.	3.	R.Ae.S. Section Lecture: "Development of 4,000 lb Hydraulic Systems," by G. Orloff.
Nov.	5.	R.Ae.S. Graduates' and Students' Section: "Exploration of Space," by Arthur C. Clarke, B.Sc., F.R.A.S.
Nov.	6.	Helicopter Association: Discussion: "The Independent Airline Operator and the Helicopter."
Nov.	6-11.	"Dates" Air Rally, Biskra, Algeria.
Nov.	10.	R.Ae.S. Section Lecture: "Gusts and their Measurement," by J. Taylor, M.A., A.F.R.Ae.S.
Nov.	12.	R.Ae.S. Main Lecture: "Stability and Control in Aircraft Design," by J. C. Wimpenny.
Nov.	19.	R.Ae.S. Section Lecture: "Aircraft Stability and Control," by A. W. Babister, M.A., A.F.R.Ae.S.
Nov.	26.	R.Ae.S. Graduates' and Students' Section: "The Case for the Light Fighter," by P. A. Norman.
Dec.	1.	R.Ae.S. Section Lecture: "Integral Construction," by H. G. Legg.
Dec.	4.	Helicopter Association: "Ground Resonance," by R. Howarth.

CIVIL AVIATION

FRENCH-AFRICAN HERON, seen in front of the airport buildings at Douala (in the French Cameroons) is one of four in African service with U.A.T. The 130-mile journey to Youande (see picture below) knocks 15 hours off the 16-hour train time for the trip.

THE I.A.TA. MEETING

AT the ninth annual general meeting of the International Air Transport Association in Montreal, Sir William P. Hildred, director-general, presented his annual report on Monday last. He said that although the world's airlines were carrying five million more passengers this year than in 1952, and over longer distances, they were actually making less money than before.

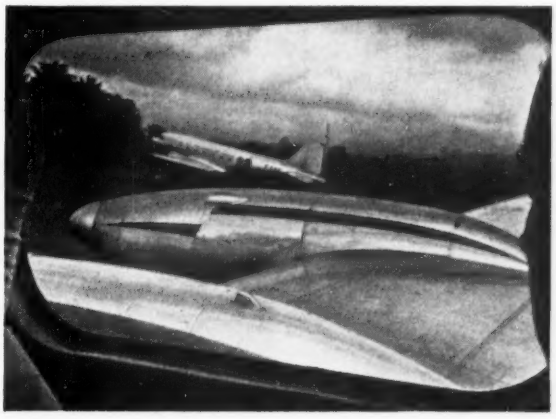
Both the increased traffic and the smaller financial returns were due to the spread of lower-fare tourist services over the international airline network, Sir William continued. Since the end of the war, airlines had reduced fares by as much as 50 per cent, but it would probably be several years before the increasing volume of tourist traffic could compensate the operating companies for the drastic reduction in price of individual tickets. In the meantime, the airlines were "operating perilously close to the economic margin," and they were liable to suffer heavily from any possible recession in world trade.

Cargo traffic, he continued, had increased during the past year by about 6 per cent to a 1952 total of 950 million tonne-kilometres —a somewhat disappointing rate, but the 1,000,000,000 mark should be passed in 1953.

"The world airline fleet, which has been extensively modernized during the past year, now numbers about 3,000 aircraft for scheduled operations, and the latest types of piston-engined, turbo-prop and turbojet machines are now being put into regular service in significant numbers," Sir William said. Fleet expansion was being accompanied to some extent by increases in the number of personnel employed by the scheduled airlines; the total was now 300,000.

Concerning frontier documents and formalities, Sir William stated: "Reductions of government formalities since 1949 have reduced the time necessary to clear passengers at gateway airports on the North Atlantic route by 750,000 man-hours per year. The cost of producing document forms has been cut as much as 30 per cent, depending upon particular routes. The number of man-hours necessary to complete documentation in airline offices has been reduced 35 per cent on the route between North and South America, and 40 per cent on the North Atlantic routes, the latter alone representing a saving of 60,000 man-hours per year. At the same time, the cost of visa fees for clearance documents has also been reduced by 50 per cent on the Europe-Far East route, and 35 per cent on routes between the Americas."

FRAMED in the window of a U.A.T. Heron, after arrival at Youande on its morning "aerobus" service from Douala, is the DC-3 belonging to the High Commissioner for the Cameroons.



The director-general maintained that governments should help operators to achieve a balanced economy by means of tax, charges and subsidy policies enabling effective reserves to be built up.

At the meeting, Mr. Gordon R. McGregor, president of T.C.A., succeeded Dr. Walter Berchtold, of Swissair, as ninth president of the Association. Canadian Pacific Airlines and T.C.A. are hosts to the session, which is being attended by senior Canadian officials, members of the Diplomatic Corps, and representatives of other international organizations, as well as by delegates from the Association's 70 member-airlines.

SWISSAIR'S 1952 REPORT

SWISSAIR flew a total of 18,277,600 ton-miles and carried 292,341 passengers last year, according to the company's latest annual report. Over a route mileage of 18,819 miles, 33,782 hours were flown by the airline's DC-6Bs, Convairs, DC-4s and DC-3s, at a load factor of 70 per cent and a regularity of 98.7 per cent. A net profit of 784,520 Swiss francs (£64,410) was announced.

THE CORPORATIONS' BOARDS

THE appointments of Sir Miles Thomas and Lord Douglas as chairmen of B.O.A.C. and B.E.A. respectively have been extended for undisclosed periods. Both appointments were due to terminate next year. Sir Miles Thomas has been chairman of B.O.A.C. since June 1949, while Lord Douglas took over B.E.A. chairmanship in February of that year. It has also been announced that Sir Arnold Overton is being appointed to the Board of B.E.A. with special responsibilities for finance and organization, and that Mr. Basil Smallpiece, financial comptroller of B.O.A.C., is being appointed to that Corporation's Board.

SCOTTISH ACTIVITY

IN the spring and early summer of this year, Dakotas of Scottish Airlines made 484 flights from Berlin, carrying over 15,000 East German refugees to Hanover and Hamburg. At home, in the past twelve months, over 10,000 passengers have been carried between Prestwick and the Isle of Man.

A weekly freight service with York aircraft between London, Prestwick and Montreal was continued until last month. The company's fleet of Yorks has also been operating from airports in the London area on trooping flights to Australia, Canada, Southern Rhodesia, Cairo, Sudan, Aden and Singapore. These aircraft, which are maintained at Prestwick, are fitted with backward-facing seats and carry 50 troops or their wives and families. Occasionally they carry cargoes of military freight. The present series of flights to Cairo will be followed by others to Nairobi and Singapore.

CIVIL AVIATION . . .

NEW COMET AND VISCOUNT SERVICES

NEW schedules and fares came into effect last week on the majority of routes operated by European airlines. Coincident with the changeover to winter schedules on October 1st, which inevitably means complete revision of the timetable, came the introduction of "tourist-class" travel on various routes between Europe and the East.

On Sunday, South African Airways inaugurated their first Comet service between London and Johannesburg. There are now four instead of three Comet services weekly on this route —two operated by B.O.A.C. and two by S.A.A. under a "partnership agreement." When flown, under charter, by South African crews on the two S.A.A. services, Comets retain their British registrations and the normal colour scheme but special transfers are used to replace the initials of the British airline with those of the South African corporation. First-class passengers only are carried in Comets, which have the standard 36-seat layout; all the new tourist services on the Springbok route are operated by S.A.A. Constellations modified to carry 58 passengers.

B.E.A. Viscounts entered service on their first domestic route, between London and Glasgow, on Sunday. Passengers on the inaugural flight included Mr. Walter Elliot, Secretary of State for Scotland, and Sergeant Scott of the Glasgow City Police "who played the bagpipes while the aircraft cruised at 300 m.p.h. at an altitude of 17,000ft." Operated daily, the Viscount Glasgow service carries first-class passengers only and is known as "The Clansman." On the same day one of B.E.A.'s new turboprop airliners flew for the first time on the London-Vienna route, and on Tuesday a 40-seat first-class Viscount re-opened the London-Lisbon route, which has not been operated by B.E.A. since June 1950. Scheduled time for the 970-mile journey is 3 hr 55 min —50 minutes less than the best time achieved between London and Lisbon by piston-engined airliners.

ON THE CONTRARY . . .

INDICATIVE of the growing concern in America about Great Britain's increasing lead in turbine-powered commercial airliners are the various articles calculated to discredit British jet transport progress which are circulated in America. One of the most recent is in the U.S. magazine *Newsweek*, which is certainly no authority on aviation matters. It states:

1. "The British are much less confident about their commercial jet airliners than they were a few months ago.
2. "First, there has been a marked disillusionment with the Comet. Second, Britain suffers from chronically slow production lines.
3. "Many (British aircraft builders) feel that the first generation of U.S. jet transports is likely to compare in size, range and speed with the second generation of British types."

Flight, which might be described as rather more closely connected with aviation than *Newsweek*, has not detected any reduction in confidence or marked disillusionment with the Comet, although it is probably true that many people feel that the first generation of U.S. jet transports when they eventually arrive will compare in size, range and speed with the second generation of British types—particularly if British, or British-licensed, gas turbines are used in them.

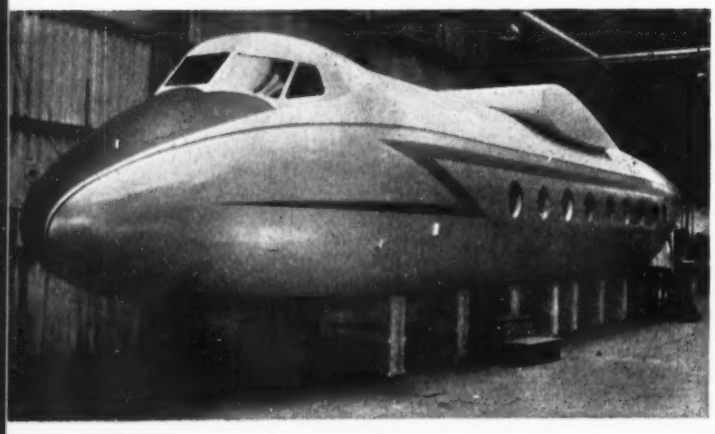
And which airliners now in production are behind on deliveries or schedules? Comets are slightly ahead; Viscounts are on time; Britannia progress is not lagging so far. How many months behind schedule are current Super Constellation deliveries?

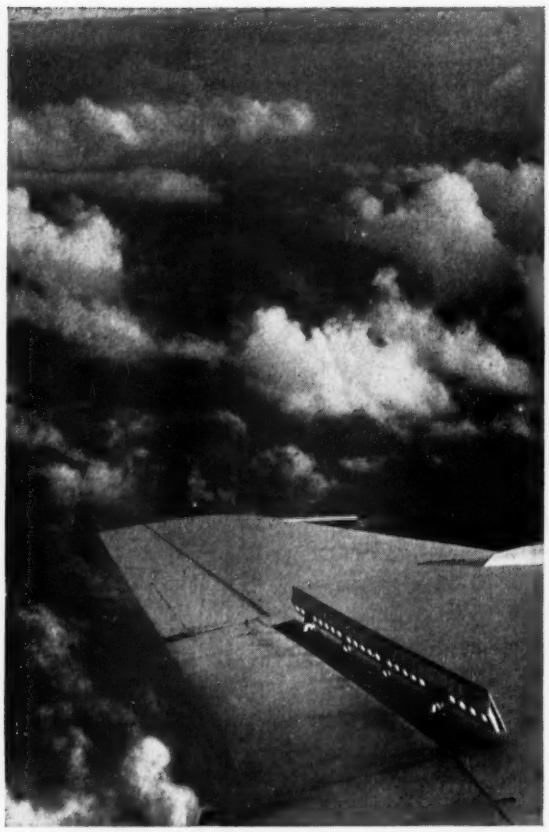
Another paragraph in the *Newsweek* article reads:

4. "The final tally may show a big margin for those who were content to wait while others discovered the bugs in a costly new age of aviation."

This is probably the most un-American sentiment we have ever seen expressed in an American magazine. Since when were Americans content to wait where technical advances were concerned, no matter what the cost? One of the nicest things about Americans is their eagerness to have a go at anything new—particularly if it is mechanical.

FOR INSPECTION: To enable the spacious 36/44-seat fuselage to be appraised by airline operators, this mock-up of the H.P.R. 3 four-engined Dakota replacement has been completed by Handley Page's subsidiary company at Reading, which is responsible for this project.





LANDFALL: En route to Rio during the recent South Atlantic crossing by the prototype Comet 2, Sir Miles Thomas secured this view of the let-down to Recife, Pernambuco. Dive-brakes are out, and the coastline is just visible at the top of the picture.

BREVITIES

FIRST-CLASS services are being reintroduced on K.L.M.'s Amsterdam-Copenhagen-Stockholm route, supplementing the present tourist flights. The K.L.M. services terminating at Tehran, Cairo, Lydda and Damascus, which carried only tourist passengers, are now offering a proportion of first-class seats.

* * *

B.E.A. announce that they have acquired a new air cargo depot near Waterloo Air Terminal on the former Festival of Britain site.

* * *

Two new overseas contracts are announced by International Aeradio, Ltd.; one, with Iraq, provides for the services of one senior and five assistant met. officers for duty with the director-general of civil aviation. The second is a three-year extension of I.A.L.'s present contract with the Ethiopian government for providing management and operational technical services at the airports of Asmara, Assab and Massawa.

* * *

Registered CF-TFX, the first of three Bristol Freighter Mk 31s ordered by T.C.A. left Filton for Prestwick on September 30th on the first stage of its delivery flight. To supplement the new all-cargo fleet, some of the company's North Stars will shortly be adapted to carry freight only. Other North Stars will be fitted with extra seats in preparation for the start of domestic coach services (at fares 20 per cent below existing rates) on February 1st next year.

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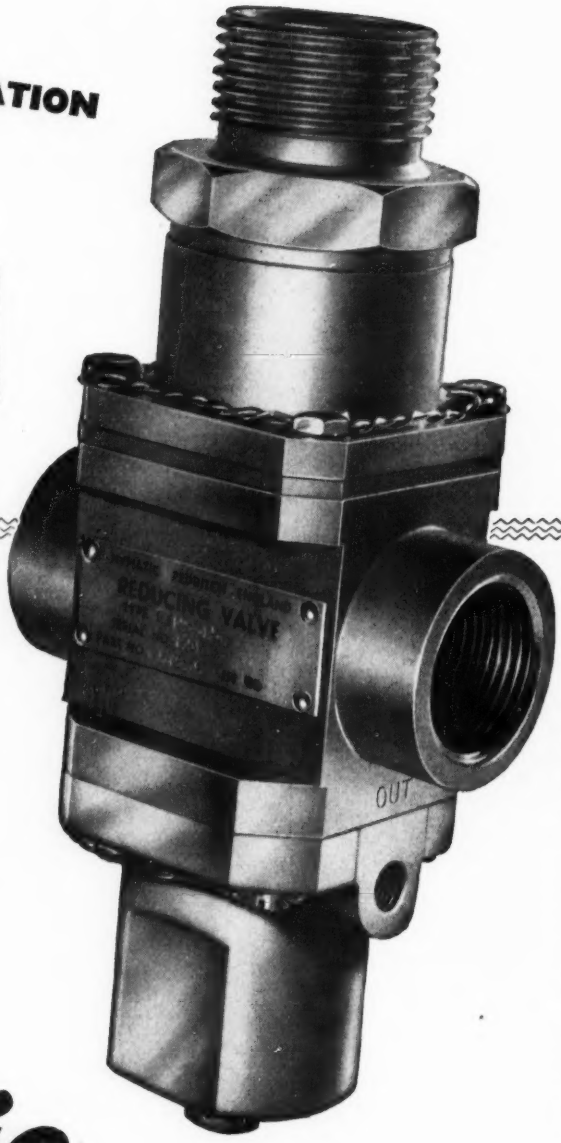


The PS.45 Series Valves will accept air bled from a jet engine compressor up to 200 p.s.i., 150°C. and deliver 3 lb./min. at any selected pressure between 5 and 20 p.s.i. gauge. The damped diaphragm ensures steady and close control within ± ½ p.s.i. for flows up to 1 lb. per min. With integral low pressure relief valve the weight is only 1¼ lb.

Hymatic

THE HYMATIC ENGINEERING CO. LIMITED · REDDITCH · WORCESTERSHIRE

141

A TWIN FROM BRAZIL

The attractive Casmuniz 52, an all-metal five-seater powered by a 185 h.p. Continental. The prototype is now undergoing flight tests for an American C. of A.

ONLY ten months were taken from the completion of the design to the first flight of the prototype Casmuniz 52, the smart light twin illustrated above. It is the first Brazilian twin-engined aircraft of all-metal construction, and has been designed and built by the aviation department of Cassio Muniz S.A., of São Paulo. The firm are Brazilian distributors for several types of American light aircraft and engines, but their country's dollar shortage and consequent import restrictions led to the development (which began some 18 months ago) of this new Brazilian machine.

The aircraft is a low-wing monoplane with single fin and rudder, and is powered by two 185 h.p. Continental engines. It has a conventional retractable undercarriage which is operated electrically or by an emergency hand-operated control. An interesting control feature (normally associated with faster and more powerful aircraft) is that the trim tabs are positioned electrically by means of small toggle-switches on the pilot's panel. Landing and navigation lights are fitted. The roomy cabin seats three passengers on the rear bench-type seat and a fourth next to the pilot. In the prototype machine full dual control is fitted.

The aircraft is completely equipped for blind flying, and the panel contains the following instruments: A.S.I., altimeter, turn-and-bank indicator, rate of climb indicator, compass, directional gyro, radio-compass indicator, air temperature gauge, artificial horizon, tab-position indicator, ammeter, clock, electric tachometers, oil pressure, temperature and fuel pressure gauges, cylinder-head temperature gauge, manifold-pressure gauge and fuel gauge. A General Electric radio transceiver is also fitted.

Flight tests of the Casmuniz 52 are now proceeding, in order to obtain a Certificate of Airworthiness (under American C.A.A. regulations). The maximum speed is stated to be 200 m.p.h., with a normal cruise of more than 165 m.p.h. Stalling speed with engines throttled back is 50 m.p.h. Single engine performance is reported to be good, but future machines are to be fitted with feathering airscrews. The range of the prototype is 700 miles; that of the production model is planned to be 900 miles.

Some 80 per cent of the aircraft skinning is of unformed aluminium sheet in order to facilitate "on the spot" repairs in isolated areas without the need for forming-rolls. Fullscale production of the aircraft by the company will be started as soon as the prototype receives its Certificate of Airworthiness. The selling price is expected to be approximately 42,000 dollars (£15,000).

THE STANSTED DISPLAY

AS briefly recorded last week, the ambitious air display staged by the Stansted branch of the Royal Air Forces Association on September 26th was an excellent example of what can be done by a small group of enthusiasts. Some 7,000 spectators were present to watch the varied flying and ground demonstrations.

The flying programme was opened by the North Weald Meteors of 601 Auxiliary Squadron in formation, and the de Havilland Heron 2 in a lively individual demonstration by Derek Taylor. More formation work followed, by the Canadian Sabres from North Luffenham and then, in contrast, by the Chipmunks of the Cambridge Reserve School, led by S/L. Hubbard. S/L. Price, of C.F.S., Little Rissington, then took off in his red-trimmed Meteor to give a polished aerobatic performance, followed by a purposely unpolished display of crazy flying by G/C. G. F. K. Donaldson in a Tiger Moth. The first part of the display was concluded by parachute drops from a captive balloon by the 10th battalion, Parachute Regiment (T.A.).

During the mid-afternoon interval, the static show proved well worth a visit. Among the M.C.A. Telecommunications unit's exhibits was an ingenious model showing S.B.A., A.D.F. and I.L.S. operation, while Aviation Traders showed their Farnborough stand and examples of their work at Stansted. Helliwells, Ltd. (who carry out maintenance for the M.C.A. Flying Unit at Stansted) showed a Dove's retracting nosewheel, and there were also exhibitions of Ordnance Survey work, typical aero engines, and airfield transport and refuelling. A Tudor V, G-AKBZ, dominated the ground display of aircraft, which included an M.C.A. Prince, and music was provided by the band of 936 Squadron, A.T.C. (Hertford).

Four Binbrook Canberras, led by S/L. Roberts, opened the second part of the programme in a series of formation and individual runs, and were followed by F-84 Thunderjets from Wethersfield in low runs across the airfield. The *Evening Standard's* red S-51 helicopter then gave a brisk, twisting display, followed by the immaculate formation rolls and other manœuvres of 4 Meteor 8s, red-ruddered, from 65 squadron. The remaining items were varied in appearance; a lively Stinson L.5, a bright red-and-silver F-84 (both from the U.S.A.F., Wethersfield), a crash fire and rescue demonstration by the M.C.A. Fire Section, and, finally, more parachute jumping by the Territorial Parachutists.

This was the second annual display organized by the branch, and much credit must go to those responsible for putting on such a fine show. Particularly valuable was the co-operation between the various units involved in the flying and the organization, and the assistance of the airport manager, Mr. W. Coen.

"ALL BRITAIN" MODEL RALLY

A CROWD of 15,000 thronged the Handley Page Aerodrome, Radlett, for the recent annual Rally sponsored by the St. Albans Model Aero Club. The event attracted entries from nearly 1,000 competitors in 100 clubs.

Although the weather was at times rather windy, particularly for the more lightly-loaded radio-controlled models, the sun shone throughout the day, contrary to the somewhat pessimistic forecasts. Some thousands of models of every shape, form and colour were to be seen flying—many outside the contest areas; such is the lack of flying fields today, particularly in the London area, that a chance to fly under good conditions is eagerly seized upon. Among the models seen and admired by visitors, many of whom were making their first personal contact with aviation, were a remarkably stable scale tandem-wing Miles Libellula; a ducted-fan Mig-15 of more than five-foot span, by A. Brooks; and a Heston Phoenix (with retracting undercarriage).

Many contestants took the opportunity to try out "new-rule" Wakefield models prior to the first 1954 World Championship eliminating contests. Much of the radio gear used was also of new and advanced design, perhaps the most interesting being the "push-button," six-channel tuned-reed equipment of S. Allen, the contest winner.

Once again the Concours d'Elegance — judged by G/C. John Cunningham—was won by a member of the Polish Air Force Association: Mr. Datkiewicz's Luscombe Silvaire, finished immaculately and with superlative detail, was an easy winner.

During speed trials—in which members of the famed U.S.A.F. "Wheels and Wings" Club of Wiesbaden, Germany, took part—at least one new record was set up. This is claimed by J. Hall, of Chingford, for 120 m.p.h. in the 3.5 c.c. class.

Outstanding feature of the rally, and a landmark in its organization, was the radio recovery service for models flying outside the aerodrome boundaries. Developed in conjunction with Pye Telecommunications of Cambridge, it proved to be of quite amazing efficiency. As models flew out of the aerodrome, Control warned observers in a tower downwind of the field, who then directed a car or motor-cycle to the position where the model had landed or was about to land. Often models were on their way back to the aerodrome within seconds of landing, and this in spite of the fact that operators at the ten retrieving stations had had no more than three minutes' preliminary instruction in the use of their radio equipment—a testimony to the simplicity of the Pye walkie-talkie.

Prizes were presented by Mr. A. F. Houlberg, chairman of the S.M.A.E. and president of the F.A.I. Models Commission.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

IN THE PORT SEAT: The Duke of Edinburgh recently flew to Germany to visit the 8th King's Royal Irish Hussars. He is seen at Luneburg in the first pilot's position of the D.H. Devon. In the second pilot's seat is F/L. Gordon, the Duke's flying instructor.

New C.O. for Queen's Squadron

THE Air Ministry announces the appointment of S/L. R. A. Schofield, a Regular officer, to command No. 603 (City of Edinburgh) Squadron, R.Aux.A.F., of which unit the Queen is Honorary Air Commodore. He succeeds S/L. Lloyd Davies.

Esher Trophy Presentation

TOMORROW, at Hooton Park, the Earl of Limerick, chairman of the Council of the Territorial Auxiliary Forces Association, is to present the Esher Trophy to No. 610 (County of Chester) Squadron, R.Aux.A.F.

The trophy is awarded annually to the most efficient fighter squadron of the Royal Auxiliary Air Force and this is the first time it has been won by the Chester squadron. The commanding officer of No. 610 is S/L. J. E. Storrar, D.F.C., and the unit is equipped with Meteor 8 aircraft.

Vase for College Chapel

A SMALL ceremony was due to be held on Tuesday last at the famous Wedgwood factory, Stoke-on-Trent, at which the Hon. Josiah Wedgwood was to hand over the special vase made for the Chaplain's Branch of the R.A.F., to be presented by them to the memorial chapel at R.A.F. College Cranwell. Invited as representatives of the College were A. Cdre. H. Eeles, the Rev. J. M. Payton, Mr. A. Constant and Mr. L. H. Bond, the chapel architect.

The vase, which stands about 30 inches high, bears the coat of arms of the Chaplain's Branch. It was designed by Victor Skellern and turned by Harry Longshaw.

R.A.A.F. Awards

DECORATIONS have been awarded to six R.A.A.F. officers for service in Korea and ten other officers and N.C.O.s have either been Mentioned in Despatches or Commended for Meritorious Service in the Air. The awards are: *O.B.E.*—S/L. E. W. Tonkin. *D.F.C.*—F/L. V. H. Hill, F/O. B. Joy, P/O. K. J. Murray, D.F.M., and P/O. J. W. Slater. *A.F.C.*—F/L. R. W. Daniel. *Mentioned in Despatches.*—F/L. K. H. Godfrey, F/O. B. T. Mullen, F/S. J. E. Kay, Sgt. T. J. Cordwell, Sgt. T. C. Sanfead, Cpl. J. F. Verdon and Cpl. S. Dawson. *Commendation for Meritorious Service in the Air.*—F/L. W. I. Pretty, P/O. M. J. Fitzgerald and F/S. L. F. Murtagh.

Guided Weapons Appointment

THE Ministry of Supply has appointed A. Cdre. H. D. McGregor to a new post in the Ministry's guided weapons headquarters organization, with the acting rank of air vice-marshal. A.V-M. McGregor will be responsible for guided weapons for the Service during the later stages of their development. This involves the completion of the designs for production, together with ensuring that the missiles satisfactorily meet all aspects of the Services requirements.

He will also be responsible for the organization of acceptance trials, range facilities, firing from ships, aircraft and the ground against a variety of targets, both in the United Kingdom on Ministry of Supply ranges and in close co-operation with the Australian authorities at Woomera.

A.V-M. McGregor, a New Zealander, aged 43, was until recently A.O.C. No. 2 Group, 2nd T.A.F., Germany. He entered the R.A.F. in 1928 and his early service was with fighter squadrons. Before the last war he was commanding No. 33 (Fighter) Squadron and was awarded the D.S.O. Joining the Headquarters of the Mediterranean Allied Air Command in 1943, he was Deputy Director of Operations, Intelligence and Plans, in North Africa and Italy until he became Air Officer Commanding in the Levant at the end of 1944.

In 1949 he went to Washington under an appointment with the Standing Group of NATO where his work received the commendation of Lord Tedder. He relinquished this post on taking up his duties in Germany in 1951.

EYES RIGHT: Lady Churchill and Air Marshal Sir Dermot Boyle appraise the potato exhibits at the 11th R.A.F. Horticultural Show held in London last week.

Air League Luncheon

MARSHAL of the Royal Air Force Lord Tedder was the principal speaker at a luncheon of the Air League of the British Empire at the Mansion House last Tuesday. The Lord Mayor, Sir Rupert de la Bere, presided.

Lord Tedder said that for some reason many people forgot or ignored the bomber force which in the last war proved to be the one common factor in the three elements sea, land and air, and did in fact, unify their operations. He felt that only by making proper provision for utilizing the immense potentialities of the bomber could the requirements for pure defence be kept within any reasonable financial bounds. The bomber alone could under present conditions provide the essential offensive element of our defences and act as a real deterrent.

Reunions

No. 164 Squadron reunion is being held on Saturday, October 24th, at the "Rose and Crown," Sloane Street, London, S.W.1, at 6.30 p.m. Particulars from L. Plows, 8 Talbot Road, London, W.2.

No. 4 Naval Fighter Wing. This year's annual reunion will take place in London on November 7th. Particulars from Cdr. G. C. Baldwin, R.N., R.N. Tactical School, Woolwich, London, S.E.18.

The Royal Air Force (Middle East) 1914-23 Dinner Club is holding its annual function at the R.A.F. Club, 128 Piccadilly, London, W.1, on November 10th. Tickets, 35s, from S/L. A. D. L. Carroll, Langley, Saffron Walden, Essex.

Exercise "Weldfast"

THE largest Allied maritime exercise yet staged in the Mediterranean took place between September 30th and October 7th. Code-named "Weldfast," it was also the first in which the two southern subordinate commands under the Supreme Commander Europe have collaborated.

The object was to test all defensive arms in the protection of the areas of Greece, Turkey and the Aegean Sea. For this purpose it was presumed that Blue forces, representing allied Southern Europe and Mediterranean commands, were attacked by the air and sea arms of Green forces. During this attack, the vital sea-supply lanes of the Eastern Mediterranean had to be kept clear of enemy submarines and mines, and amphibious counter-attacks were made on islands in the Aegean area. All convoys sailing in this area under Greek and British Naval escort were under the command of CINCAFMED, Admiral the Earl Mountbatten of Burma, K.G., with Area Commands as follows: Eastern Mediterranean Area, Vice-Admiral Lappas, Royal Hellenic Navy; North Eastern Area, Admiral Altincan, Turkish Navy; South Eastern Area, Vice-Admiral Davis, R.N.

Amphibious assault convoys which sailed in the Aegean Sea during the week were subjected to submarine and air attack and defended by their escorts and shore- and sea-based aircraft. A barrier patrol was instituted in the Kasos Strait to prevent enemy submarines from penetrating into the Mediterranean, and the entrances of the Piraeus, Suda Bay and the Gulf of Salonika were swept clear of mines.

The final episode of the whole exercise was due to be large-scale amphibious landing on the island of Crete, in which troops of the Southern European Command were to take part, including Greek, Turkish and Italian units as well as U.S. and Royal Marines. Strong winds during the week-end delayed this operation.

Exercise "Mariner"

THE major NATO sea/air exercise "Mariner" ended last Sunday, October 4th. The purpose of the exercise was, broadly speaking, to re-enact the Atlantic battle, exercising to the fullest possible extent all sections of naval defence and protection against surface, under-surface and air attacks on both convoys and fleets. The area of operations extended over all the NATO Commands in the Atlantic, the Channel and the North Sea.

The exercise began on September 16th with the sailing—from Norfolk, Virginia, and other United States naval bases—of the American elements of the principal Blue (friendly) striking force. Up till the 23rd, these forces carried on an independent anti-submarine and anti-aircraft war, coming under attack from Orange (enemy) submarines and aircraft and suffering a number of casualties. At 0800 hr on the 27th, junction was made between the American and British striking fleets, at a point south-west of Iceland. The combined fleet then sailed south-eastwards until the 30th, when the British element returned to the Clyde and the U.S. element continued southwards. A logistic support force protected by H.M.C.S. *Magnificent* revictualled and re-supplied ships taking part in the exercise. A further independent hunter-killer group of one United States carrier and six escorts worked in the central Atlantic area on anti-submarine patrol.

In the meantime, a convoy sailed from Scotland to Norway protected by H.M.S. *Illustrious*, which was then due to take part in a subordinate Scandinavian land-sea-air defence exercise. Further actions were fought in the Channel and southern North Sea areas, where Orange aircraft laid mines and attacked convoys in the face of Fighter Command and carrier-borne defences. Orange forces in this case were drawn from Bomber and Training Commands of the R.A.F., and 2nd and 4th A.T.A.F.

Aircraft taking part on the Orange side included Lincolns, Washingtons, Canberras, Varsities and F-84s. Shackleton maritime-patrol squadrons were widely dispersed, No. 220 Sqn. being based at Quonset Point, Rhode Island, U.S.A., and a further Shackleton squadron near Lisbon. French maritime Lancasters operated from North Africa, and Dutch Lockheed Harpoons from Holland. U.S.N. Neptunes were at Kinloss, and Fleet Air Arm Skyraiders aboard H.M.S. *Eagle* with the Blue striking fleet. Orange air-striking forces in the Atlantic were controlled by J.A.S.S., Londonderry, and Canadian maritime Lancasters successfully attacked Blue striking force 300 miles out to sea from Newfoundland. Helicopters were also engaged in seaward defence in the Clyde Estuary.

When the scene of action shifted to the Eastern seaboard of the Atlantic the Canadian maritime patrol Lancaster squadron was moved to St. Eval in Cornwall. It then joined the other NATO units in anti-submarine warfare and a large number of attacks were made on snorkelling submarines.

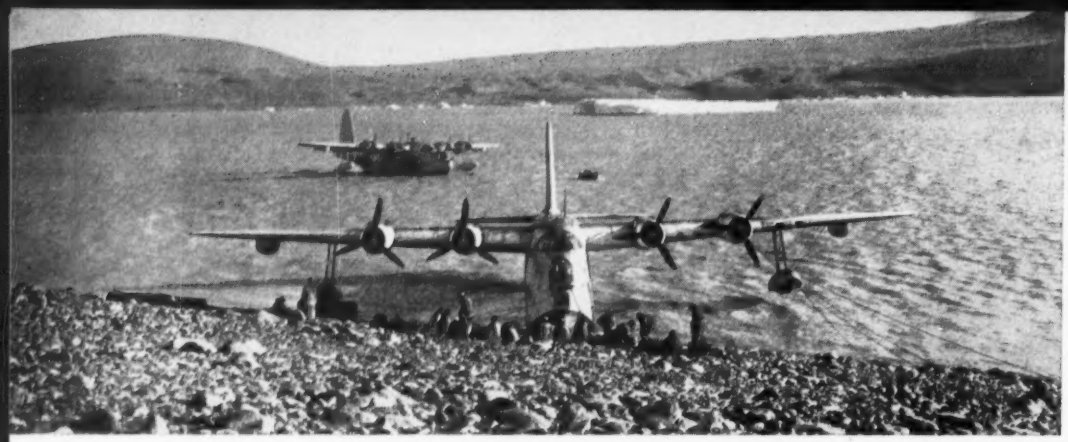
During the final stages of the exercise the English Channel became the scene of heavy engagements. Shore-based aircraft had full freedom of action and air battles over the convoys between Blue and Orange forces occurred frequently. Even in these confined waters submarines had to be dealt with on many occasions and minesweepers were hard at work in the Thames Estuary clearing Orange minefields.

The weather, seldom uniformly good at this time of year, turned out even worse than expected. The cruiser H.M.S. *Swiftsure* and the destroyer H.M.S. *Diamond* collided while refuelling at night off Iceland and H.M.S. *Sheffield* returned to Greenock on October 4th after her upper structure had been damaged during a storm in the Denmark Strait. Apart from these incidents, however, mishaps have been commendably few considering the great intensity of operations.

In order to make the best possible use of the big forces engaged in "Mariner," the exercise was so adjusted that the tempo of action was unnaturally high. Extensive use was made of flares and smoke to simulate torpedoes, bombs and mines. Perhaps the most important factor of the exercise is that it is being analyzed in all its phases with a view to detecting and subsequently correcting mistakes in operating techniques. Such a procedure has not been carried out in previous exercises, with the result that many mistakes may have gone undetected. Because of the heightened scale of action, it is, however, dangerous to draw any firm conclusions from the seemingly high "casualties" sustained during the exercise.

CRANWELL TOURISTS: A party of 17 cadets from the R.A.F. College, Cranwell, recently visited Australia and were shown over Parliament House at Canberra. They are seen on the steps of the House together with their guiding officers.

DROPPING IN: During Exercise "Mariner," Admiral Sir John Edelsten, C-in-C. Portsmouth, made his first helicopter trip, to visit the Northwood H.Q. of Admiral Sir George Creasey, C-in-C. Eastern Atlantic.



ARCTIC RE-SUPPLY: (Left) R.A.F. Sunderlands on Britannia lake, Greenland. The boat nearest the camera holed its hull and had to be repaired before take-off. (Below) Lending a hand on the end of the haul line is Dr. Fleming, Bishop of Portsmouth, who travelled up in a Sunderland. (Bottom) The glaciers, lakes, snow and coastal indentations of Greenland presented a fantastic picture to the Sunderlands' crews.

SERVICE AVIATION . . .

Polar Fuel Drum Drop

DEPICTED on this page is the Sunderland airlift of stores for the British North Greenland Expedition at Britannia Lake, successfully completed on August 21. As soon as the stores had been landed there a party of six men set out from Britannia Lake for the station at Northice, 250 miles away, to receive an airdrop of supplies from Thule. This was made by two Hastings of Transport Command which flew in and free-dropped some 30 tons of stores, including a large number of drums of petrol for the expedition's "weasels" (tracked amphibian vehicles). The fuel was in special 45-gallon drums; to reduce the bursting effect on impact, each contained only 30 gallons.

At Northice, which had been completely snowed under during the party's absence, preparations were made to receive the drop. Strips of red fabric were laid out on the snow and the weasels and their trailers disposed to give the Hastings pilots visual reference to objects of known size and shape. Over a featureless waste of snow there is no horizon and no method of judging height. Since the free drop had to be made from 50 feet, some visual datum was indispensable. (It will be remembered that last year one of the Hastings "landed" during a low drop and the crew had to be rescued.) A radio beacon was also set up at Northice to guide the aircraft in. When the aircraft arrived from Thule, 400 miles away, those on the ground passed the height and distance, judged from its known wingspan, to the pilot by R/T. Drums were dropped free from 50ft, and hit the snow at an angle, bouncing along in a flurry of snow. Although no fewer than 265 drums were dropped in this manner, only one was broken, while four others sprang small leaks. Altogether eight sorties were flown from Thule over a period of four days.

After some trouble with one of the weasels—the repair of which involved twice changing an engine in sub-zero temperature—the next journey to the West Point Station was begun. The 180 miles took three days to cover. Here another dropping zone was marked out ready for a further free drop of 90 drums of petrol. For this drop, however, visibility was poor, with snow and mist, and the stores had to be dropped from a slightly greater altitude, so orange smoke candles were used as additional markers. Three sorties were successfully completed to West Point in one day. Damage to the drums was in this case little greater than previously at Northice. In all, the loss sustained in these free drops was a mere two per cent of the total.

The Autocar
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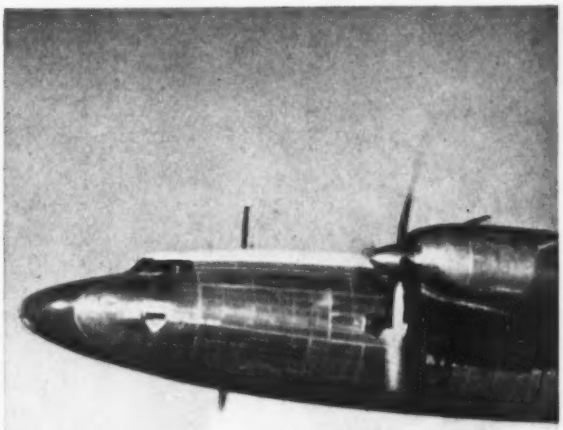

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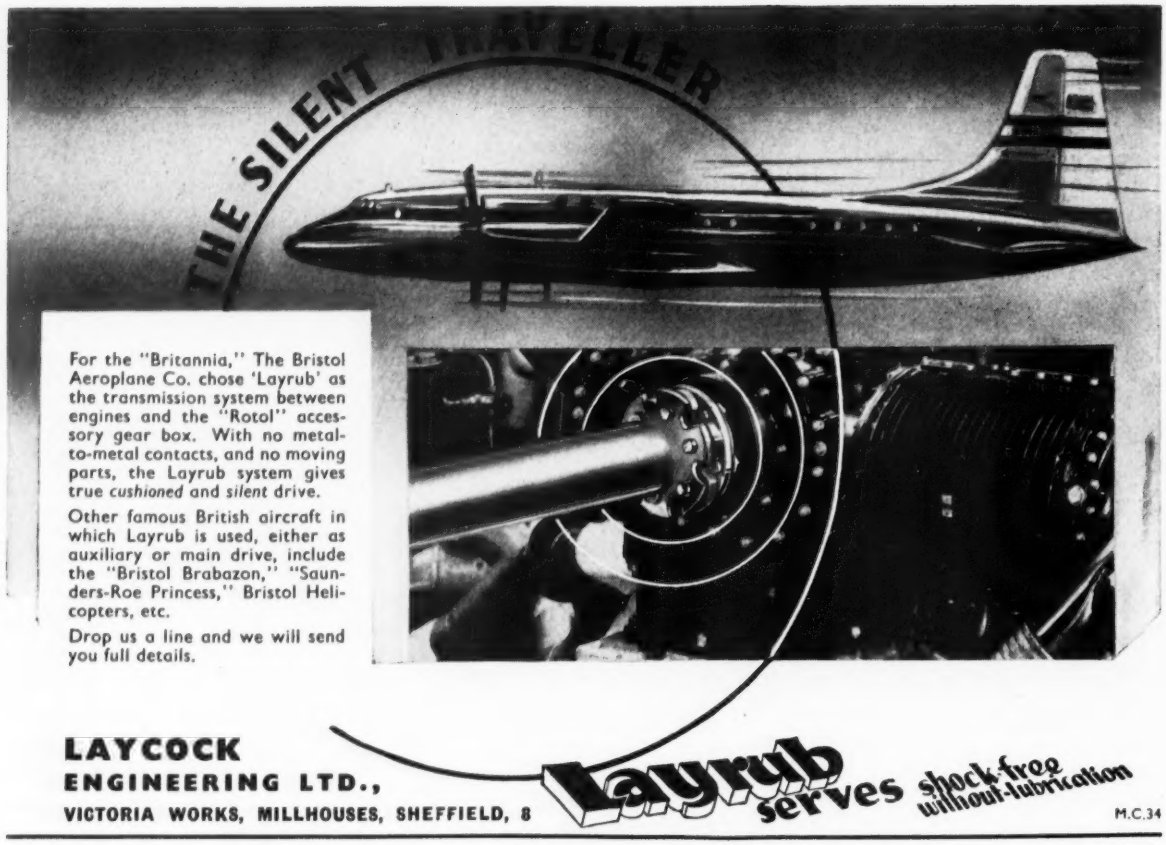

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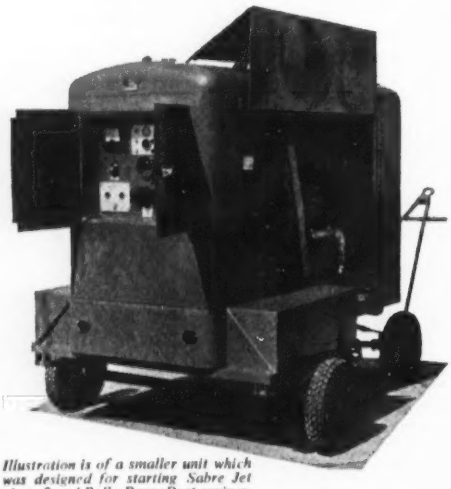

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Application No. 27/1 from Cambrian Air Services, Ltd., of Cardiff Airport, South Wales, for permission to operate certain of the frequencies on their normal scheduled service on the route Cardiff-Bristol-Southampton-Paris (Application No. 27) approved by the Minister of Transport and Civil Aviation, as a normal scheduled service between Southampton and Paris only.

THESE applications will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9, Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [1140

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INDEX TO ADVERTISERS

	Page
Aerocontacts, Ltd.	24
Airwork, Ltd.	16
Aviation Developments, Ltd.	4
Babb Co., Inc., The	23
B.B. Chemical Co., Ltd.	21
Boulton Paul Aircraft, Ltd.	3
Bristol Aeroplane Co., Ltd., The	Cover iv
British Air Line Pilots' Association, The	26
Brooklands Aviation Ltd.	28
Cellon, Ltd.	10
Cross Manufacturing Co. (1938), Ltd.	23
De Havilland Aircraft Co., Ltd., The	14
Dowty Equipment, Ltd.	26
Eagle Aircraft Services, Ltd.	25
English Electric Co. Ltd., The	27
Fairey Aviation Co., Ltd., The	13
Field Aircraft Services, Ltd.	25
Fishers	23
General Electric Co., Ltd., The	6
Godfrey and Partners, Ltd., Sir George	1
Handley Page, Ltd.	11
Hawker Aircraft, Ltd.	8
Hymatic Engineering Co., Ltd., The	20
Iliffe and Sons, Ltd.	21
Irving Air Chute of Great Britain, Ltd., The	18
Jessop and Sons, Ltd., William	Cover ii
Kelvin and Hughes (Aviation), Ltd.	Cover iii
Laycock Engineering, Ltd.	22
Lewis, Ltd., D.	23
Lockheed Aircraft Corporation	7
Martin-Baker Aircraft, Ltd.	15
Moulded Components (Jablo), Ltd.	27
Muir and Adie, Ltd.	23
Napier and Son, Ltd., D.	9
Percival Aircraft, Ltd.	26
Petbow, Ltd.	22
Pitman and Sons, Ltd., Sir Isaac	26
Prentice and Trafford	23
Salter and Co., Ltd., George	2
Shell-Mex and B.P., Ltd.	17
Short Bros. and Harland Ltd.	12
Société Nationale de Constructions Aéronautiques du Sud-Ouest	6
Sugg and Co., Ltd., William	21
Teddington Controls, Ltd.	4
Vandervell Products, Ltd.	19
Vickers-Armstrongs, Ltd.	Cover i
Westland Aircraft, Ltd.	5

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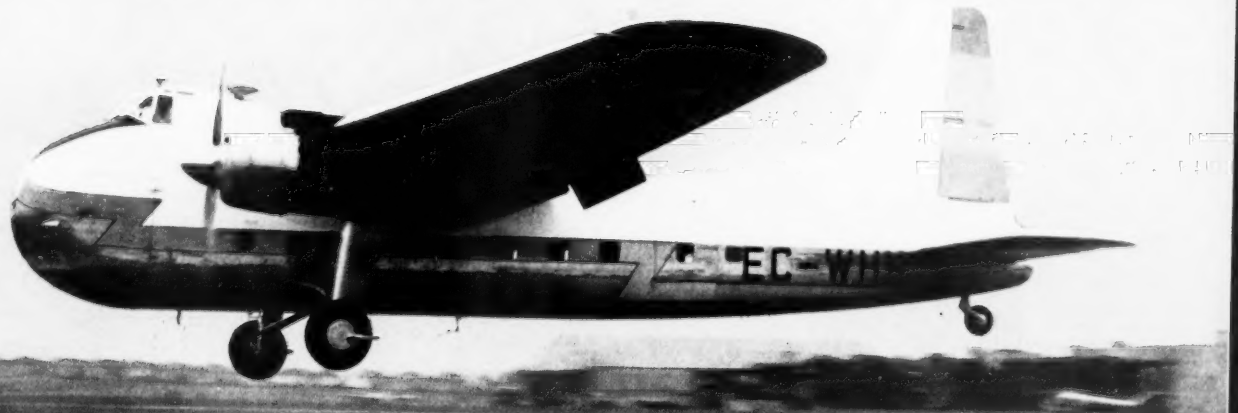

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